Timely Matters

Mediatization, News Effects and Market Price Action

Thesis

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Contents

1. Introduction – the Media's Influence on Human Perception

I remember him crying. No doubt about that. He was in tears, in spite of the presence of a TV camera filming him. Or maybe he was crying because of the camera? That I don't know, and probably I never will. He was a Russian general of aviation, or maybe of something else, but he was certainly a general. He was crying over the death of one of his subordinate aircraft pilots. The pilot's plane was shot down by Georgian forces over the disputed Abkhazia region. At the time, I was no more than twelve years old. This happened about twenty years ago, but I cannot forget the reportage dedicated to the event in the Russian "Vremya[1]." "Vremya" was a newscast that ran several times a day on the main Russian channel, which was called, at the time, ORT. It was one of the main sources of information in my teenage years, although I had other news sources as well. My second news source was "Moambe[2]." "Moambe" was the main newscast on central Georgian TV.

In 1992, with Georgia being in its third war in a row, my family was drawn into poverty like the majority of the Georgian population, and we could not afford to buy newspapers on a regular basis, so TV news was our only choice.

The pictures shown that particular evening will remain with me my entire life. This was not because I saw something extraordinary. Peace was the exception at the time, not war. This particular event was an unforgettable experience because of the contrast the two newscasts created in my perceptions. "Moambe" started its main evening broadcast at 8 o'clock with the breaking news. The storyline was absolutely clear: The Georgian defence forces had shot down a Russian aircraft, which was flying over Georgian territory in defiance of the peace agreement. Additionally, the aircraft was bombing Georgian positions. Furthermore, it had targeted not only military but also civilian targets. Hence, by shooting down the aircraft, young Georgian forces achieved another great victory over the enemy. I saw the Georgian head of state visiting the place where the remains of the aircraft were found. This was an act of self-defense, I thought. There was no doubt about it.

[1] Vermja actually means "the time" when translated from Russian to English.
[2] Moambe, in Georgian, means either storyteller or news bringer, depending on context.

At nine o'clock in the evening, "Vremya" started its broadcast with the same breaking news. Once again, I saw the aircraft's broken parts and the dead pilot's body. Here too, the storyline was absolutely logical: the Russian aircraft was on its regular reconnaissance mission to make sure that the peace agreement reached between the Abkhazians and Georgians with Russian mediation was indeed maintained. The aircraft was shot down by the Georgian forces without any prior warning. It was absolutely clear: Russia had to deal with the treacherous act. To support the story, the "Vremya" correspondent interviewed a Russian general who was speaking about the past heroic acts of the dead pilot while honoring his unique personality. Later on, they showed the general crying at the pilot's funeral. His tears seemed genuine. He was truly in mourning. The Georgian action had violated the peace agreement, I thought. It was perfidious behavior; everybody had to respect the truce.

I saw nothing unusual or extraordinary in the news I watched that evening. Yet the two interpretations were so different that nothing made sense any more. How could both newscasts present such different opinions on the same event and both be right? How could one event be evil and good at the same time or, taking it further, could both sides be partially good and partially evil? The question may sound naïve, and it probably is. But at the time, I was only twelve, and most of the questions I asked about the world around me were simple. However, often the simplest questions require a most complex investigation.

My quest for the answer to the above dilemma started at the time of Georgia-Abkhazia or, if you wish, the first Georgian-Russian war, and it still goes on today. This present monograph is another attempt to answer the question or, at least to bring light to some aspects of this complex issue.

The research in this paper looks at financial news and investigates how and why and under what circumstances it is affected by public opinion. When reading this research, we have to bear in mind that I am attempting to understand the impact news and news-content has on group decision-making. By a group, I mean an entire society, or at least very large parts of it. By using the above example, I wanted to make my intention clear: I firmly believe that the way news is formulated affects our decision-making and our thinking processes. Let me put it plainly: news of the same content presented with different words and sentiments can

cause diametrically different feelings. News reportage may direct our attention to some aspect of an event while neglecting others. Thus, news presentations influence us.

I believe that news influences us according to a very simple formula. Any kind of news content has two main tools of influence: the first is the selection of an event to report. There are millions of daily occurrences; why do journalists select some and ignore others? Thus, the very selection of which events to report affects our decision-making processes. Second, of course, the way event is described or interpreted affects our choices. I believe that the second aspect is much more important than the first.

Commonly, in mass communication science, the first aspect spoken about above is called "agenda-setting." The second aspect has many different names. In this monograph, I will call it "framing." I am not the first to call this phenomenon "framing," but I find this term consistently useful.

A case can be made that framing is not the most important aspect of shaping perceptions, but rather agenda-setting is. We will be exploring that case as well. To start out by saying framing is more importance than agenda-setting in influencing people's perceptions of an event is provocative and may be said to be a bit of a "devil's advocacy" for reasons of initiating the discussion.

A third important term in addition to "framing" and "agenda-setting" is the term "factual evidence." Factual evidence is not really the same as the agenda-setting, but the two concepts are closely related. When I use the term, I refer to all things that could be considered to be indisputable facts or occurrences, beyond their perceived news value. This includes everything from an earthquake in Japan to a royal wedding in the United Kingdom. These events occurred; they are factually secure. Whatever the media is speaking about in any given moment is factual evidence; the event actually did occur. Factual evidence also could be referred to, with some reservations, as agenda-setting.[3]

Factual evidence plays a critical role in my research. Any form of framing, which I will discuss in this study, cannot exist without evidence, and furthermore no strong framing effects can occur without strongly supportive factual evidence or sequences of factual evidence. To put

[3] For a detailed description of Agenda-Setting theory please refer to the literature review part of this book.

it very simply, framing is the presentation of factual evidence in a certain perspective or in a certain light.

There will be more detail on all of these concepts in further sections of the monograph. For now, I would like to move on to framing. In this study, I define frames as perspectives through which factual evidence is seen or interpreted. Frames could be represented by one simple word or they can take up reams of complex text. Additionally, I believe that with increasing complexity, though still remaining within the realm of comprehensibility, frames become increasingly powerful. I argue further that a frame, no matter how powerful or evocative it may be, is weak as a single entity. Frames, in order to become influential, must be combined with kindred frames continuously and frequently over a certain period of time. Most importantly, frames, in order to become salient, must be supported with uncontested factual evidence over a long period of time. Through continuous repetition and aggregation and in the right context, certain aggregated frames or framing groups can become more salient than others, and hence, they can dominate public opinion. Along with aggregated salient frames, other frames and framing groups exist to which I refer as counterframes. Unlike aggregated salient frames, counter frames appear with lower frequency and with disrupted continuity.

Most importantly, the interpretations of facts provided within frames deviate from the factual evidence significantly. Time is also significant. The longer the aggregated salient frame remains confirmed by the factual evidence, the stronger its influence on opinion formation. With the passage of time, the influence of counterframes in comparison to aggregated salient frames diminishes, and at a certain point is omitted completely. Furthermore, after a critical point is reached in time, counterframes are perceived as part of aggregated salient frames and generate effects identical to aggregated salient frames. Yet with a change of factual evidence, the influence of dominant frames diminishes. Accordingly, a change in factual evidence reduces the influence of aggregated salient frames over opinion formation. However, in order for this diminishing effect to become observable, the change must be given sufficient time.[4]

[4] Also different framing concepts, inclusive mine, are in details discussed in the state of the art chapters of this monograph.

Neither agenda-setting with its factual evidence-based approach nor framing are the main concepts used in this paper. Rather, there is an overarching theory of "mediatization." "Mediatization" is a concept which can have radically different meanings in different sciences. Depending on scientific belief, one could refer to it as mediatization or as medialization. Depending on one's scientific discipline, it could mean a loss of imperial immediacy or it could mean "something else" as attributed to it in the sociological or the communication sciences. Researchers are divided over what they mean by the word. But the concept of mediatization itself is very intriguing. For me, it is so challenging that I decided to write an entire thesis about it.

Speaking very broadly, mediatization can be defined as a very long term process or the state in which the influence of media or media messages over society is constantly increasing or stays permanently on a very high level. In this process or state,[5] society does not define the media; society is defined through media communication. Media follows its own logic and, hence, society develops itself according to the media's logic. Hence, when we want to understand the effect of media news on society, we first have to look at the mediatization process; otherwise, we will miss important parts of the entire puzzle. It could be said that agenda-setting, framing, and other theoretical concepts described in this study are means of understanding, analyzing, and accessing mediatization effects.

First and foremost, I will attempt here to make the concept of mediatization comprehensible and then measurable. I will try to show that this concept could be very useful for understanding changes in media and in the social environment. Hence, I argue that we actually can define and measure mediatization, making this phenomenon empirically observable in the long as well as the short term. In order to show this, I will travel on very unusual paths. First, as mentioned above, I will connect this concept of mediatization to other social theories and concepts, both dated and modern, which at first glance may not seem to have anything to do with each other. Then I will move down (or, if you wish, up) to economic and financial markets in order to demonstrate the effects of the mediatization phenomenon on our daily lives.

[5] As shown in the later chapters, for me mediatization is process as well as state in which we all live. Theoretically, mediatization could reach its peak and hence transform itself into the permanent state in which society lives.

In 1964, Bertram Gross first introduced the term “information overload” (Herman Gross, 1964). Alvin Toffler then popularized this concept in his bestselling book *Future Shock* (Toffler, 1970). Information overload is a term which cannot be avoided in this work. In my opinion, it is one of the main aspects of the mediatization phenomenon. Modern times have very interesting characteristics: often, we do not realize that we are living in an era when 50 million tweets are produced every day, and millions of pieces of news appear and disappear on daily basis.

I remember my first experience sitting in front of the Bloomberg Terminal. The initial experience was overwhelming. I saw all possible news appearing and disappearing in decimals of seconds. I barely was able to read some words on the screen, so quickly did they fly by. Some entire news items made no sense to me. I then decided to count the amount of news going through the terminal every minute and to quit after reaching 600. This would amount to sixty news bits per second. After analyzing this, one would argue that the question Alvin Toffler asked in his book was never so relevant as it is today: Can we humans handle this amount of information? Are we able to make reasonable selections which will assist us in the accomplishment of our day to day tasks? Paradoxically, the endless opportunities which are provided by this infinite amount of information could bring us to the verge of being unable to utilize them in a reasonable manner. Yet we cannot continue using the means and methods of information processing we were used to in the past, as they cannot serve us adequately in the modern age. In this monograph, I suggest that if we want to comprehend the daily load of information, we should find new ways of information processing which are suitable to the amount and quality of modern news flow. In sum, I will argue that mediatization is a phenomenon which we should not fight but with which we have to acclimate ourselves to in order to live comfortably with it.

1.1 Ideas

This monograph is split into several parts in order to represent the ideas described above in hierarchical order. First, following the “academic” logic of the conduct of proper research, I will discuss theoretical aspects before moving on to the methods of analysis and the working hypotheses. Similarly, all subchapters of this monograph follow the hierarchical model with

some minor deviation. In the part of the monograph where I discuss theoretical concepts relevant for the study, I address the problems related to the concept of mediatization first, and then I provide my own operational definition of it. Later, I address theoretical issues related to agenda-setting. Here, admittedly, I break the hierarchical structure and move agenda-setting before framing, despite the fact that the theory of framing takes the most prominent place in this research, right under mediatization. I do this on purpose. I think that a good understanding of the agenda-setting concept is crucial before one moves on to the theory of framing. We have to remember that many researchers refer to framing as second level agenda-setting. Following agenda-setting, I discuss the concept of framing in detail. Framing as a media concept pertains to the manner in which specific media organizations or politically inclined or socially motivated bodies present certain ideas about a social phenomenon. The aim is generally to influence the perception of the audience in a desired way. After the review of the most important social science theories is finished, I move on to economic science.

This monograph deals primarily with financial markets. For me, financial markets are a very important part of the social system and are perfect for doing sound empirical research, because all kinds of positive and negative events are displayed there in numerical form. Interpreting numbers, as we will see, is much easier than any other kind of data when using quantitative methods of empirical analysis. Because I look at numbers, it would be negligent not to discuss theories which deal with information processing in financial markets and which were developed in the field of economics.

After finishing these reviews, attention will be turned to the empirical methods which I used for understanding the concept of mediatization. The empirical chapters of this research can be split in two major parts. First, we will look at texts and then at prices. I believe that we need a deep understanding of texts in order to measure their impact on the markets, and we need a deep understanding of prices in order to see their reactions to incoming news. Here, I will introduce the text analysis method which I characterize as a new way of news processing. I argue that when millions of pieces of news flood us every day, humans, in order to analyse the news adequately (and hence, to function adequately) need assistance. In this sense, computer-assisted analysis of texts seems to be one of the most obvious ways to proceed. Many will reject this idea by arguing that humans cannot be replaced by machines

or that machines are not intelligent enough to make the complex decisions humans can. I completely agree with these arguments. In this research, you will not find the call to delegate all human tasks to machines. You will merely find the suggestion to use machines as supporting tools or assistants which can make the world around us feasible to navigate. I, of course, never make the claim that machines are more intelligent than humans. Although I am not really interested in testing this hypothesis scientifically at the moment, on the personal level, I can say that I rejected the idea that machines are more intelligent than human beings even when Deep Blue won the chess competition against Garry Kasparov. There always will be machines that will defeat humans, and there always will be humans who will defeat machines, even the most intelligent ones. It is not a question of which is more clever or intelligent. I argue that combination of men's judgment and computers' data processing capabilities will make the modern problem of information overflow solvable.

Accordingly, I will introduce a method of analysis which will enable us, in this case for research purposes, to process large amounts of data in the shortest possible time, compressing them in a way that will dispose of waste content, make large amounts of data comprehensible, and then be applicable in interaction with the marketplace. At this stage, I will attempt, by using certain statistical methods (most prominently the Granger causality test) to show whether there are some causal connections between the obtained news data and price changes. If the mediatization process takes place, then we certainly should see some strong influences. Using new news processing methods, I will present three different databases and observe their influence on the market.

At this point, some words are needed on the limitations of the research. Despite the importance and ubiquity of financial markets, we cannot rigorously generalize the results presented in this research. We simply cannot argue that because mediatization effects are (or are not) observable in the interaction between news and market price actions, therefore an entire society and all its compound realms are (or are not) mediatized. Because of the complexity of human nature, things might look differently in, say, politics, religion, online gaming, or in private life. Therefore, all arguments you will find in this monograph are true for the financial markets alone, and only with great caution should they be extrapolated to other segments.

At the end of the research, I will provide an interpretation of the entire study. Hopefully, these interpretations may serve as a starting point for future studies and observations.

One of the major ideas we will introduce in this research is the idea of information diffusion. In the theoretical part of the monograph, the concepts of information diffusion loop and information diffusion speed will emerge. Along with this, information delivery systems will be discussed. We will differentiate between first, second, and third generation information delivery systems. As the concepts are complex, they will be addressed separately in various parts of this research, and at the end they will be built into a workable symbiosis.

1.2 Research Questions

I refer to mediatization as the process of change and/or the state in which institutions, and even entire societies, are defined anew by media, and in which the outcomes of debates over all major political, social, economic or other important issues increasingly depend on media reporting and follow the media's logic. Hence, we can understand mediatization as the shift of power from governmental institutions to the media. With this in mind, I could formulate my main major interest in one simple sentence: Can we empirically observe the increased influence of media over a society? Like many others, this simple, one sentence question requires a thousand sentences to answer it. It is not within the scope of one thesis to answer this question. My aim is to reduce the question's complexity by focusing my attention not on society at large, which would include all aspects of our lives, but only on one part of it: global financial markets. Therefore, let me reformulate my research question: **Can we empirically observe the increased influence of news media sources over market price action?**

I have many reasons for choosing financial markets as the field for applying my models. The major reason for my choice is that despite the complexity of financial markets, there is one single factor that sums them up: prices and the way they change.

Accordingly, by asking and, if possible, answering the question, "Does media sentiment influence or cause market price action or market price change?" I also ask and answer the question of whether media affects financial markets. To make this point clearer, let me add

further that in my opinion the strong influence of the news on market price action is, for me, a direct indication that the mediatization process is occurring.

I now turn my attention to concrete research questions and look at them in greater detail.

RQ 1: Does global media sentiment influence market price action (in our case, changes on the Dow Jones Industrial Average - DJIA)?

By "global media sentiment," I refer to the influence of the "global press mood" on price action. I am interested in establishing whether the general mood of newspapers, magazines, news web pages, and important blogs influences price changes and investment behavior. As a result, I attempt to detect and "measure" the global media mood, and use statistical methods to determine "casual" relationships. The methods of mood measurement as well as statistical analysis are described in greater detail in chapters to come.

If we detect that mediatization can be observed on this level of measurement, we can say that our entire society seems to be well informed about developments in the financial markets, and that the hypothesis of the "two class" information society that I introduced in the above chapters should be rejected, at least in part.

RQ 1.1: Does positive global media sentiment influence market price action (DJIA) in a stronger manner than negative media sentiment?

This second research question is directly connected to the first one. Here, I review the impact positive news has on market price action independent of business cycles.

When answering this question, I have two aims in mind. First, I would like to retest the findings of other studies by comparing their findings to my large database created within the framework of this present research. Second, I would like to provide some additional proof or rejection of the mediatization theory.

The assumption is quite simple: If society is as highly mediatized as suggested, we should be able to observe the increasing influence of general media mood over the markets. At the same time, the question of whether such news is negative or positive should not be as important as described in macroeconomic research.

RQ 1.2: Does negative global media sentiment influence market price action (DJIA) in a stronger manner than positive media sentiment?

In the theoretical part of this thesis, we will observe that various studies provide different results when they look at the influence of news on the markets. Some studies show that market participants ignore positive news, and some suggest that negative news has more impact on the market than positive news.

Contrary to this, some studies observe that negative and positive news have different levels of impact on market price action, depending on the contexts in which the news items are read. For instance, negative news might have a greater impact during an economic uptrend. In other words, the market reacts to negative news in a stronger manner when the negative news emerges in a generally positive environment rather than in a negative environment.

But studies do not note any increasing impact of positive news during an economic downturn. The dataset in this study, which was created during the data collection phase, enables us to look at the mood of the news as a cumulative entity. At the same time, if we wish, we can differentiate between negative and positive news, and observe its impact, if any, on market price action.

This is what I will do by answering several of my research questions. First, with research question 1.2, I would like to see whether negative media sentiment has a strong impact on price action independent of any context. Accordingly, I first look at the strength of the influence of negative media sentiment independent of any business cycles.

RQ 2: Can we observe different global media sentiment effects on market price action (DJIA) in different business cycles?

Here I will test another hypothesis introduced in this thesis. Some studies reviewed here argue that when we observe the media in different business cycles, we can see different effects of positive and negative media moods. The databases used in this research enable us to establish whether different impacts can be observed in different business environments. This is what my fourth research question addresses.

RQ 2.1: Can we observe different positive global media sentiment effects on market price action (DJIA) in different business cycles?

Research question 2.1 should be placed in relation to research question 2. In other words, I test the impact of positive news in different business cycles to see whether positive news has some observable stronger impact in good and bad economic environments.

RQ 2.2 Can we observe different negative global media sentiment effects on market price action (DJIA) in different business cycles?

Here, we continue looking at general media mood, particularly, at negative media mood in different business cycles. Research question 2.2 tests the impact of negative news in various economic environments.

RQ 3: Does online financial media content influence price action (EUR/USD exchange rate) to a greater extent than general media sentiment?

After differentiating between business cycles, I make a distinction between different types of media. Research questions one to six look at general media mood. The seventh research question investigates the impact of online financial media, namely Reuters and Bloomberg, on the markets.

Here I review the relationship not between financial media sentiment and the Dow Jones Industrial Average, but between financial media sentiment and the Euro and United States Dollar relationship. I explain the reason for this switch between DJIA and exchange rate in chapters to come. In research question 3, there is no differentiation between different business cycles and between positive and negative media sentiment.

RQ 4: Are there differences observable within financial media titles in terms of their influence on market price action (EUR/USD exchange rate)?

Research question 4 continues differentiating and looking into details. Now, I differentiate not only between the general media and the financial media, but I also look into the differences between financial titles. Namely, I study whether Reuters and Bloomberg have different impacts on market price change.

RQ 5: Does paid financial media content influence market price action (EUR/USD exchange rate) to a greater extent than public financial media content and public global media content?

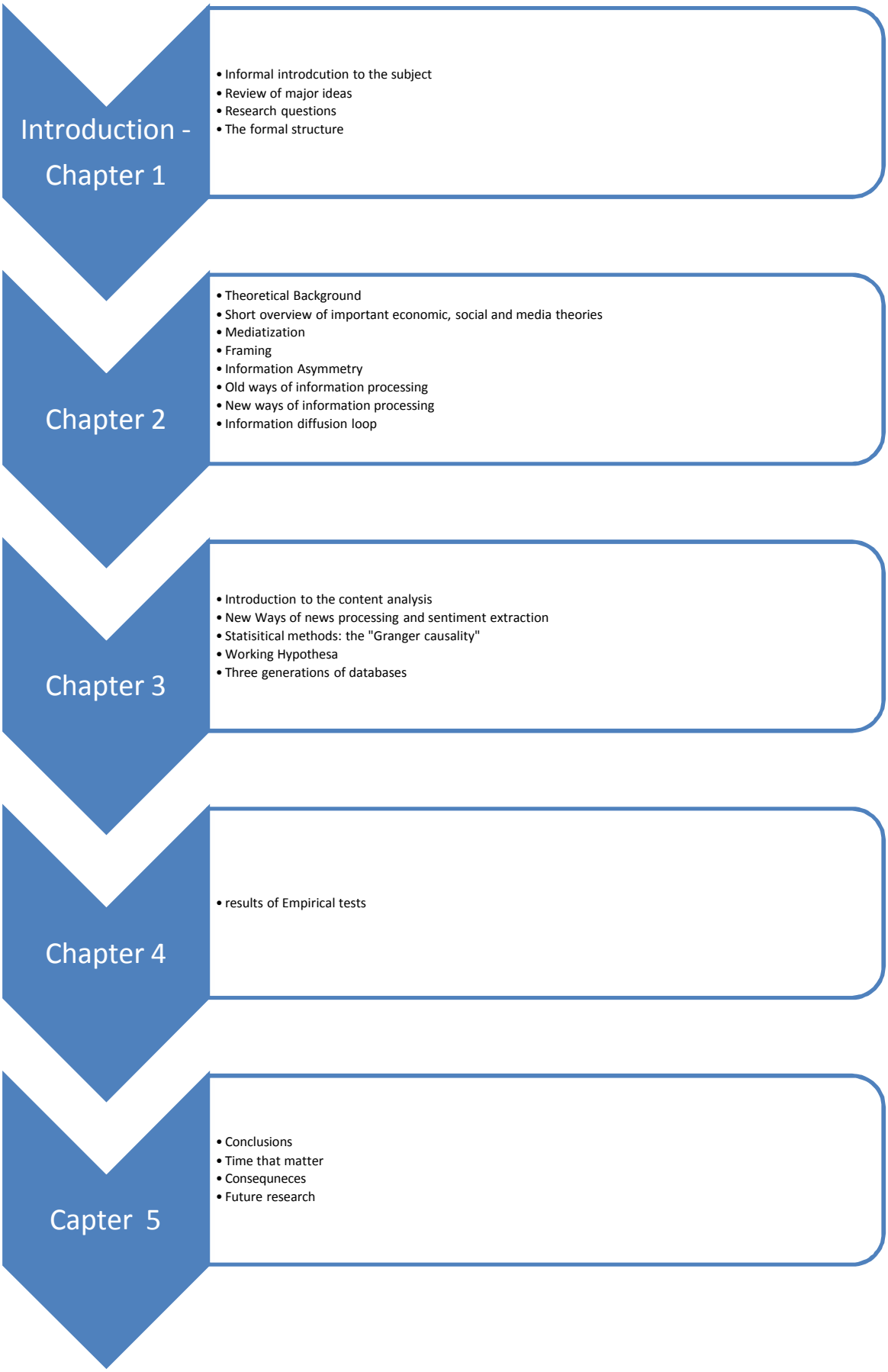
The last research question also continues differentiating. Now, the difference is between financial media content, which is available online and without charge for anybody with access to the Internet, and financial media content available only to subscribers and involving relatively high expense (hence, it is not freely accessible to everybody). Here we observe the impact the subscription news of Bloomberg and Reuters has on financial markets.

I am deliberately keeping this research question section of the thesis as short as possible. The questions and answers are reviewed again in the chapters that discuss the theoretical background of this thesis and which display the results of statistical analysis and interpretations.

1.3 The Formal Structure of the Present Work

This work has five major parts. First, of course, is the Introduction. I consider the Introduction part of the thesis and to be as important as all the other chapters of the work as here I have tried to explain why the subject is important in general and what the major research questions I would like to answer are. In this Introduction, I attempted to understand and portray the role and importance of the news in modern society. Here, I answer the question why I wrote this monograph and why the reader of this thesis should be interested in the topic and continue reading.

The next chapter of the research will briefly address what I call the “seven fundamental problems” of modern media. We will take a look at problems which modern societies face when dealing with mass media and mass communication issues. This part of the research should not be misunderstood. I do not argue that we have only seven fundamental problems; I say that these particular problems are relevant to this study and that considering them will equip us with the theoretical background necessary for full understanding of the empirical part of the research.



Graph 1 Thesis Structure

Further, we will briefly discuss issues connected with rational choice and will look at the concept of trust across sociology, mass communication, and economics. Additionally, we will look at the question of how economics has studied the effects of news on price action. Then we will look at the role of the concept of "homo economicus" in public opinion and news effects research. Later, we will look at an efficient market hypothesis, followed by behavioral finance, which will bring us very close to prospect theory and, hence, to the beginnings of framing. Lastly, I will address issues connected to prospect theory and agenda-setting. Accordingly, agenda-setting will conclude our general observations before gradually moving to the theories that matter the most to us: to the theories of mediatization and framing.

Then we will devote our attention to forms and methods of information distribution along with media channels. First, we will review how information was distributed before the age of the Internet. Then we will take a closer look at information distribution channels, show similarities and differences between them, and attempt to split these channels into a certain, understandable structure of news flow and distribution. Later, we will look at the importance of information distribution and diffusion speed. Then we will take a rather unexpected turn towards military and business strategies and present the importance of the OODA Loop for the information diffusion. Then we will come to the main point of this part of the thesis and present the "information diffusion loop."

Here, we will understand why the concept of time is a most important concept alongside of framing and mediatization theories.

The third chapter of the thesis will be dedicated to the empirical methods of news analysis applied in the research. This will be an introduction to content analysis methods in general and to the methods used in the study in particular. Later, I will introduce what I call new ways of news processing, a method also utilized for the data collection and analysis of sentiment in this study.

The methodological part of this monograph will also introduce a statistical method which is commonly referred to as "Granger causality." We will use it for the statistical analysis of the gathered data. Finally in this chapter, I will attempt to explain "Granger causality" to the reader who is not very well versed in this statistical model. After making the "Granger

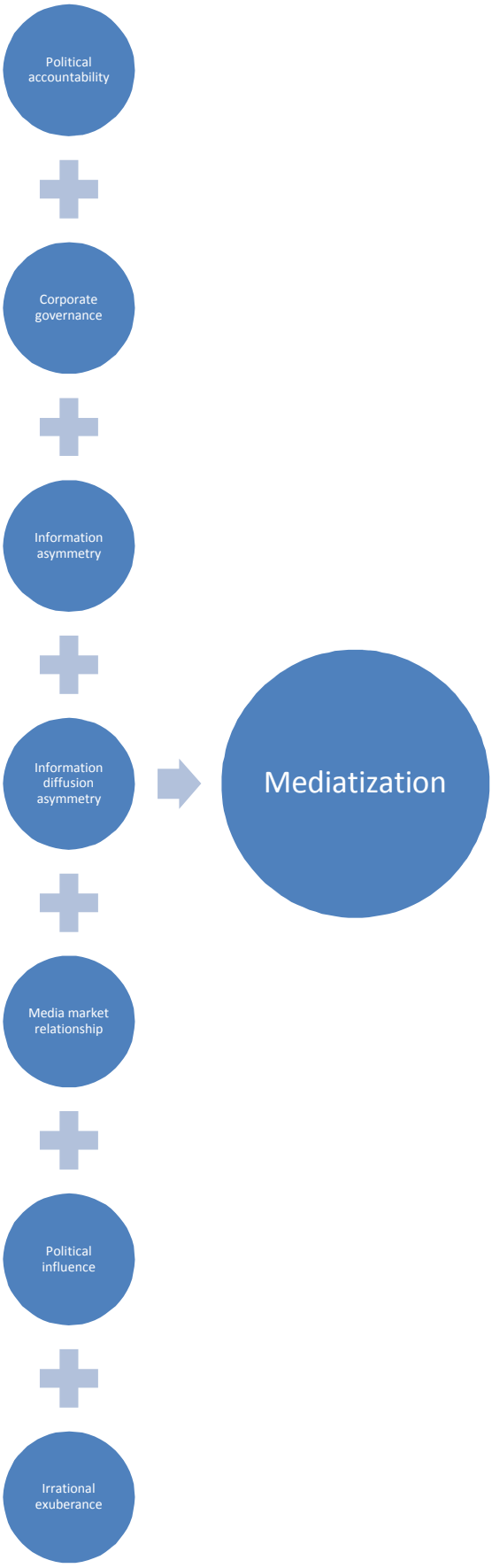
causality" method understandable to the reader, I will present the detailed working hypothesis in the same part of the work.

A final, fourth chapter of the work will describe the results of sentiment analysis, explain them, and then will interpret the findings and reach a conclusion. We will once again look at mediatization and the importance of the news diffusion loop within the framework of this concept.

2 Theory - Challenges of Modern Media and Society

In this second chapter, I will address the theoretical aspects of my research. I will begin by addressing global issues. In this section, I argue that modern mass media faces seven major problems. The first five major problems will be discussed briefly. Later, after reviewing media effects theories, I will move to the sixth and seventh problems and devote greater attention to them, as this monograph attempts to offer some solutions for what I call the seventh challenge (the seventh challenge deriving directly from the sixth one). One might argue that the five problems I address here are beyond the scope of this study as they are not directly connected with the research questions already presented above. Yet all five problems are direct causes of mediatization or else they are the results of it. Therefore, a short overview of all major factors which affect and are related to the process of mediatization is very important.

The first problem of the modern media is the problem of accountability in general and political accountability in particular. Besley et al. notes that most democracies with low free media and free press scores also tend to be low-income countries. How the government deals with media outlets affects the development of the news media and the quantity and quality of news generated. Limited free speech and limited freedom in the mass media are found to be connected to low income. The authors argue that strong links exist between media development and other development indicators such as income per capita or literacy. They show, that after controlling for income per capita and other variables, the evidence also indicates that newspaper circulation and television ownership are lower in countries that have a larger fraction of state-owned media (Besley, Burges, & Prat, 2002, p. 46). According to the research, countries in which political elites are not directly accountable for their actions score lower in terms of free media and freedom of speech. Media in such countries is seen to be the instruments of governing elites. This argumentation leads to the assumption that the least developed democracies are the least mediatized countries. Media power in such countries is so weak that politicians cannot be held accountable for their wrongdoing. That is, their wrongdoing is concealed from citizens because the media has no power to overcome the resistance of the political elites and pursue a democratic agenda. All this means that to some level, the higher the level of the mediatization is, the higher the



Graph 2: Fundamental Problems Leading to Mediatization

level of democratization. That means that a high level of democratization either causes a high level of mediatization or vice versa.

A second major problem of the media lies in “irrational exuberance.” Various forms of news media compete to attract the public's attention, which they so desperately need in order to thrive. Survival, for a news media outlet, necessitates finding and directing their audiences towards fresh and fascinating news. News that has the potential to be talked about later creates the prospect of expanding their audiences. If the news piece is an ongoing story, it encourages audience loyalty—they want to read the next piece of the story from the same source. News outlets, while in competition, can learn a lot based on their competitors' successes and/or failures, and the result is a creative process as media outlets seek to infuse the news with emotionally evocative details, to invoke human interest, and to familiarize audiences with certain public figures, who appear almost as recurring characters (Shiller, 2002, p. 86).

Years and years of competition have made media professionals quite savvy in the art of attracting the public's interest. The appeal of financial markets to news media outlets makes perfect sense, for financial markets are a constant source of news. Other markets, like real estate, provide semi-constant forms of news as well, but they don't have the ever-changing daily price adjustments that financial markets do. The stock market, because of the pace at which it changes, is a fountain of relevant and compelling news (Shiller, 2002, pp. 86 - 87).

Categorically, the only other news-generator of a similar scale is sports. Not surprisingly, financial news and sports news make up around half of the content of many newspapers. To attract audiences, the news media often offers debates—lengthy discussions about things that it are believed to be on the public's mind (Shiller, 2002, p. 87). Sometimes, this entails "debating" issues that many may not deem worthy of in-depth discussion. The media may present the issues as if there are "experts" on both sides of the debate, a practice which leads the public to believe that there *are* experts on both sides of an issue that they may be undecided about. In the past, I've been called by news workers who want me to go on record as having an extreme belief about an issue. When I declined, the news person nearly always asked for me to direct them to another "expert" who was likely to support that position (Shiller, 2002, p. 87).

The result of these practices is that media can play a role in the transmission of ideas without concrete evidence for the efficacy of those ideas. Competition encourages news media to skew the presentation of issues and to sometimes present issues that might be better ignored (Shiller, 2002, p. 89). For news directors to go against competitive pressures and only publish intellectual and important news stories along with informed views about them would be risky for media outlets' financial positions, but it would likely result in a broadening and elevation of the public's knowledge about issues.

Many forms of media try to anticipate and inform our questions about market behavior, but many contain few salient facts or considered opinions about the issues. Sometimes it seems that news items have been created because of the pressure to come up with something that matches the market numbers. These pieces usually note the bull market and then re-state statistics, almost always focusing on those stocks that have risen significantly more than others (Shiller, 2002, p. 89). While many call these stocks "leaders," there is little evidence to support their having caused the bull market. The need of getting increased attention from the media leads to the inevitable irrational exuberance of attributing market performance to unproven, so-called causal factors.

The third major problem of modern media lies in the need for political influence. With the realization that the mass media is able to direct the flow of information comes the conclusion that different features within the operation of the mass media can have significant political consequences. Mass media is, of course, a business and must operate with an eye to the bottom line. In other words, they must be cognizant of and maximize increasing returns to scale. For example, the initial cost of producing a television program may be high, but the cost of an additional viewer is small (Strömberg, 2001, p. 109). This same relationship is true for newspapers, where the initial high costs of a building and machinery as well as the gathering, writing, and editing of the news must be borne, but the subsequent costs of printing and delivering additional newspapers is minimal.

This cost structure induces a media, motivated by profits to report on issues that draw the attention of large groups while frequently neglecting minority groups and special interests. This bias results in the probability of political consequences. If, in fact, there were no mass media, policies affecting a small group would be watched carefully by that group. These

same policies would not be known to the wider, more diverse population, so there would be little or no resistance to the wishes of the small group. A politician in this situation would have difficulty calling attention to or effecting change in these policies. Consumers who are not affected by them do not have an incentive to become informed about these policies or the politicians' view regarding them. The small group stakeholders, or any special interest, would certainly remain informed and exert their influence on the politician(s) for favorable decisions. The existence of mass media counters this bias by providing a platform for politicians to share their messages with the broader, more varied population (Strömberg, 2001, p. 102).

The fourth major problem of the media lies in corporate governance. The majority of information that people obtain comes from the media, which has an important role in determining which information the people get to see and hear. By doing this, the media adds credibility to that information. As the media can reduce the costs to public relations agents of evaluating and collecting information, they play an important role in the development of reputations. In corporate governance, the media can affect reputation in at least three ways (Dyck & Zingales, 2001, p. 109).

First, politicians can be induced to introduce corporate law reforms or enforce the existing laws, as any media attention about their inaction could damage their future political careers or shame them at home or abroad (Dyck & Zingales, 2001, p. 109).

Second, media attention can affect reputation through the standard channels that are emphasized in most economic models. Under this traditional understanding of what reputation is, a manager's wages will depend on the shareholders' and future employers' views about the manager and whether he or she will truly look after their interests when not being monitored (Dyck & Zingales, 2001, p. 109). Managers might not take opportunities when offered that are self-serving in order to create the impression that they are good managers.

The third point which is being highlighted here is that media attention affects the reputations of mangers and board members in the public eye as well as in the shareholders' view (Dyck & Zingales, 2001, p. 109).

Dyck et al. found that a larger newspaper circulation was linked to better environmental responses on average. This remained true after environmental regulation, availability of information on environmental outcomes, and economic development (measured by GDP) are taken into account. Accordingly, corporations try to influence the media in order to change the news flow in such a way that they remain in a good public light.

The fifth problem of the modern media lies in media market relationships. Media in general, as well as their structures and relationships with governments and markets, vary among different countries (Herman, 2001, p. 62). Consequently, it is safe to assume that the particular nature of the relationships between media and markets differs correspondingly both within and between countries. However, recent years have demonstrated a shared tendency toward replacing government-sponsored, and in some cases government-owned and government-controlled, non-commercial media with commercial media funded by advertisers. In addition, the media are becoming more concentrated and conglomerated while increasing their operations across borders and while increasing private sector control of the media (See: Bagdikian, 2000; Herman & McChesney, 1997; McChesney, 1999).

Moreover, recent decades have witnessed several other developments which contribute to the increased similarity of media structures and media outputs all over the world. These trends include cross-border information flow from such common outlets as CNN, BBC, News Corporation and its affiliates, and the growth of cross-border ownership and coalitions. Besides, media managers, driven by rising competition and commercialization, tend to cater to the interests of their owners and advertisers as well as to the interests of their affluent audiences, which homogenizes media even further.

As a result of these developments, the U.S. media, for instance, are becoming more and more centralized and, given the prevailing influence of the American media, determine the gradual Americanization of the media elsewhere in the world. The growing power of the U.S. media system across the globe stems from an expansive distribution of American movies, syndicated television shows, advertising agencies, television channels such as CNN, and American ownership and alliances on the global level. The predominance of the U.S. media is evident even in cases when cross-border development takes place outside of the USA. For example, global sales of Spanish soap operas and other shows, as well as the production of

Brazilian Globo's and Mexican Televisa's, show that most successful global media ventures are very similar to the American model (Herman & McChesney, 1997; Straubhar, 1996)

There is a variety of definitions of the term "market" in contemporary literature. Some people define it as a free and competitive enterprise; others understand it as private ownership, both competitive and monopolistic; while yet others assert that market is best described as collective choice of market players, as in such cases when a majority favors a particular stock or opposes some particular government decision. Consequently, many people agree that the market nowadays shapes national policies to a large degree. To demonstrate, the market can exercise its control by determining the flow of capital in or out of a particular country or dictate investment decisions which influence governments' decision-making processes. Thus, in a broad sense, the market can be defined as the combined actions and preferences of major market participants who, by and large, favor private ownership. However, the market's attitude regarding free and competitive enterprise is far from clear (Herman, 2001, p. 64).

There is ample evidence to illustrate the ambivalent position of the market toward free competition. For example, in the United States, the interests of the pharmaceutical industry and other powerful corporate entities are often protected by the granting of monopoly rights. Thus, intellectual property rights, in the form of patents and copyrights, take precedence over the benefits of free trade. Moreover, intellectual property rights can sometimes be improperly exploited through obtaining excessive monopoly time and possible patenting of the assets which were in the public domain beforehand. The mainstream media often allies itself with the market by discouraging any meaningful public debate regarding the misuse of monopolistic rights and the potential benefits of free enterprise (Herman, 2001, pp. 64-65).

The last two problems of the media, which are the problem of information asymmetry and the problem of news diffusion speed, are interconnected. As they are major issues which will be addressed in this thesis, I will review them separately and in greater detail later in the coming chapters.

2.1 Media Effects

The scientific study of human communication blossomed in the twentieth century as technological means of communication were discovered and enhanced. Prior to the invention of the “wireless” in the latter 1800s, communication depended on newspapers, mail, and word of mouth. With the advent of telegraphy, telephony, and radio, the range of a person's ability to communicate was increased ten- or even a hundred-fold. Mass media, communication to many people at one time, became popular in the early 20th century in the form of radio programs and motion pictures. What would the Great Depression have been like without Franklin Roosevelt's “fireside chats”? How much would ordinary people have known about World War II if there had been no newsreels? As the availability of communication technology expanded, so did interest in its effects. During World War I, media were manipulated to serve the war effort, bringing about a new understanding of the media's power. The first major theory of news effects was born: the hypodermic needle or magic bullet theory.

Over time, further study of news media effects has led to other theories and a multitude of cross-disciplinary studies, both experimental and descriptive, that have sought to characterize, categorize, and measure the effects of the news on the opinions, beliefs, and behavior of the audience. News effects can be studied from a variety of perspectives. A political science perspective gives insight to the effects of candidates' speeches and commentaries on subsequent individual political positions, as demonstrated by attitudes and by actions (voting). Viewing the study of news effects from the standpoint of sociology is slightly different; for instance, the target of news effects usually changes from individuals to large groups, such as social change organizations. Using the principles of social psychology, one can determine the interactions between individual effects and group effects (e.g., between individual opinion formation and internal communication in a large group). Business communication is another type of communication that is very important, but it has not been studied to the extent that political communication has been studied (Meijer & Kleinnijenhuis, 2006, p. 17). These are only a few of the possible ways to view news effects on society, but implicit in each one is the idea that exposure to media can (and usually does) have an effect on the thoughts, feelings, and beliefs of the listener or viewer.

A variety of research methodologies have been used to study news effects in communication science, from descriptive case studies to multivariate regression analysis of complex numerical data. Each type of research has advantages and disadvantages. For example, multiple regression statistics permit evaluation of significance with regard to a normal curve, but much of the data about news effects is not strictly numerical. One methodology that is particularly important for news effects research is content analysis, in which written, spoken, or video news stories are coded to indicate the presence of certain characteristics, such as types of frames or the use of negative labels. Since studies vary as to what characteristics are being considered, there are no coding systems accepted by all, and there may be questions of reliability and validity, in addition to the difficulty of comparing research studies that code similar constructs in different ways. This problem is addressed by de Vreese (2005, pp. 51-62), in which he identifies a rubric that can be used to evaluate news frames, even cross-nationally. He notes that framing is a process which involves both independent and dependent variables and is most useful when it is studied alongside the content itself.

This chapter will examine first the well-known theoretical approaches to the effects of news media and the types of news effects that are predicted by each approach. A representative sample of news effects found in the literature review will follow; then there will be discussion of the evidence for and against the theories. Finally, the research will conclude with a summary and suggestions for further research.

As indicated above, one of the first theories of news effects was the hypodermic needle theory, also called the magic bullet theory. The oft-repeated example of this theory is the “War of the Worlds” radio broadcast given by Orson Welles and the Mercury Theater, which caused widespread panic across the United States. The effects of a news story are thought to be like an injection with a hypodermic needle – instant, direct, and powerful. They are also uniform; that is, individuals with a variety of characteristics will react the same way to a given news story. In this model, the audience is completely passive, at the mercy of those who create the news. It made sense to behaviorists in the 1920s and 1930s, but it was soon supplanted by new and better supported theories.

When scientific study of news effects began, it became clear that the hypodermic needle theory was too simplistic, and that the audience was not the tabula rasa that the

behaviorists assumed it was. In the 1940s, Lazarsfield developed the two-step flow model, which postulated that opinion leaders, people that individuals know and respect, controlled the influence of news stories on the audience. This is one type of a limited-effects or minimal-effects model, directly opposing the powerful news effects presumed by the earlier theory. The two-step flow model was later modified to include more variables at each step and new steps, as researchers learned that news effects were much more complex than originally thought.

Agenda-setting theory is a limited-effects model. It states that news stories may not tell people what to think (e.g. positive, negative, neutral attitudes) but they do tell them what is important to think about. Thus, if there are many news stories about flooding in Pakistan but none or few about lack of rain in South Africa, the Pakistan floods will be considered to be more important, or salient, than the South African drought. Since many people acquire their news from only one source, they may not even be aware of the drought. Agenda-setting will not suggest blame or responsibility for a given issue, but it will definitely affect what issues are on the table.

More recent theories of news effects, sometimes termed subtle-effects models, feature aspects of the opposing powerful-effects and limited-effects models. For example, some groups, such as children, can be more susceptible to the message and may incorporate it into their belief systems in a way very similar to the magic bullet model. Even adults may, under certain conditions, accept what they hear or read with very little critical thinking. This effect is most common in the case of emotional rhetoric and propaganda which inspires fear, such as that used by the Nazis. However, most people do evaluate news stories based on what they already know and believe. The media may serve to set priorities, reinforce memory, and frame stories as positive or negative using the appropriate labels and concepts, but its effects generally are not overwhelming.

Under the subtle-effects umbrella, several theories have been explicated. They are as follows: the cognitive mediation model, which includes the knowledge gap hypothesis, context/framing theory, agenda-setting and priming theory; the interpersonal interaction theory; and the uses and gratifications model. Each model focuses on a slightly different set of variables or assigns effects to them that vary proportionally.

Cognitive mediation or processing theory postulates that an individual's thinking processes impact his or her response to news stories and other types of media (Eveland, 2001, pp. 571-601); (McLeod & Detenber, 1999). Each person has a style of information processing; this includes preexisting knowledge, ideology, tendency to reflect, initial attitudes and their strength, and assumptions. As a result of their individual cognitive processing styles, members of an audience will not respond in identical ways to the same news event, no matter how it is presented.

News effects can be mediated by other personal variables as well. For instance, the "knowledge gap hypothesis" states that an individual's knowledge increase is dependent on his or her socioeconomic status. Those with higher status acquire knowledge faster than those with lower status (Eveland & Scheufele, 2000, p. 216). Therefore, socioeconomic status can be a confounding variable because it affects information processing and response to news stories. Eveland and Scheufele (2000, p. 217) suggest that research into changes in size or direction of the knowledge gap as a function of another variable such as priming or framing is the most useful approach.

Agenda-setting is sometimes considered to be a stand-alone model for news effects, as indicated above, but in other research it is viewed from the perspective of cognitive mediation theory. In this case, agenda-setting effectiveness is determined in part by variables other than those that are a part of the news itself. These variables may be at the message level or the personal level. For example, one aspect of agenda-setting is telling individuals what other people believe to be important, but the individual's information processing style will affect whether he or she changes priorities based on the agenda-setting news story. Message characteristics such as affective tone, framing, and frequency can also mediate the effectiveness of agenda-setting and priming.

Context or framing theory states that the audience's interpretation of a given news story will depend, to some extent, on the context of the story, or the "frame" that is placed around it. Context may be given by labels, by additional information, by comparing one story with another, and in many other ways. Druckman (2001, p. 227) defines framing as the media's emphasis on certain aspects of an issue which causes individuals to focus on these aspects when making political decisions. Studies have shown that framing can have a significant

effect on an audience's reactions. For example, in one experiment, a news story about a hate group rally was presented under two conditions: first, within a free speech frame, and second, with a public safety frame. In the first condition, subjects were more likely to sympathize with the protestors, while in the second condition subjects were more likely to view the protestors as troublemakers who should be arrested (Nelson, Clawson, & Oxley, 1997, p. 567583).

Interpersonal interaction theory explains audience reaction to news in terms of two factors: elite influence and interpersonal conversations. For example, the media may frame an issue as related to free speech, but the response of individuals is partly dependent on the nature of interpersonal conversations after exposure to the framed news story. Druckman and Nelson (2003, pp. 729-731) found that subjects placed in a mixed discussion group after a news presentation were much less influenced by the framing and other characteristics of the presentation than subjects in no discussion or unmixed discussion groups. This research illustrated the interaction between top down (elite influence) and peer-mediated (interpersonal conversations) input. It can be considered an expansion of the two-step model also, but with greater emphasis on the media than was indicated in limited-effect models.

Uses and gratifications theory focuses on individual feelings, motivations, and actions to explain the effects of news (Perse, 1990, pp. 17-36; Ruggiero, 2000). For example, a person who wants entertainment will seek out news stories (perhaps those that are more sensationalized) and respond to them with varying emotions such as horror or excitement . A person who wants to increase his or her knowledge will seek out a very different sort of news story. The knowledge-focused person may choose complex news stories that are more detailed and less emotional. Uses and gratifications theory is more interactive than the other theoretical perspectives explained above (Ruggiero, 2000, p. 9). It explicitly recognizes the ability of viewers, readers, and listeners to make choices about where and how they get their news, and the variability of news effects according to these choices (Perse, 1990, p. 19).

Social movements theory addresses the influence of the news on the development and activity of social change movements. This is a sociological perspective, and it differs from the

above viewpoints by its emphasis on groups rather than on individuals. It also uses slightly different terms to explain these group effects. For example, when the news frame defines problems it is termed “diagnostic framing,” while news that proposes solutions is called “prognostic framing” (Benford & Snow, 2000, pp. 611-639).

Recent work in the area of news effects and communication science supports complex interactions among many variables, including message characteristics and individual characteristics, which determine the strength, direction, and content of effects. Some of these variables also influence each other and can lead to second-level effects. As a result, studies of complex interaction theories require robust experimental models and powerful statistics, whereas some earlier models were based on descriptive statistics and qualitative experimental design.

The theoretical approaches to news effects outlined above describe potential mechanisms for many types of effects, including gatekeeping, salience transfer, priming, positive/negative bias, memory-based effects, episodic framing, and thematic framing.

Gatekeeping refers to the role of news writers and broadcasters in determining which news stories the public will hear. If the producers of a given news channel do not consider a certain story of interest, it will not appear on that channel's programs. The process of choosing which stories to tell is often guided almost entirely by the target audience's interests – i.e., what will bring in the most viewers. Thus, the public is told what it “wants” to hear rather than what an ideologue wants it to hear. However, the opposite generally is true in a police state where the government controls the media. In that case, only stories that place the government in a favorable light or that will motivate the people to do what the state wants them to are allowed to be aired or printed.

Salience transfer often occurs in the context of agenda-setting theory and may be caused by exposure alone, as illustrated in the example of floods and drought, or by exposure plus additional framing, such as poll results (“63% of people think the economy is the most important issue, so it must be very important”) and expert opinions. Salience transfer can be mediated by interpersonal communications (interpersonal interaction theory) and opinion leaders (the two-step flow model) as well. An individual's prior knowledge also affects his or her beliefs regarding the salience of news (cognitive mediation theory), so salience transfer

can occur at three levels: the media level, the interpersonal level, and the individual level. The three levels can influence each other and may even cancel one another out, as when individuals are resistant to media priming due to individual value systems. Salience transfer is an effect that appears simple at first but when examined closely, it demonstrates its complexity.

Priming occurs when the message activates a set of beliefs (called a schema) in the mind of the viewer. It is dependent on characteristics of the viewer, such as availability of the schemas, as well as characteristics of the message, such as applicability of the message to the schema. If the right conditions are met, the priming message will make the schema more available to the viewer as he or she carries out cognitive tasks, such as evaluating a news event. Since a priming message must be received by a viewer in order to carry out its function, priming is sometimes considered to be a part of agenda-setting. It is also related to cognitive mediation theories, since the presence of the schema in the mind of the viewer is necessary.

Memory-based effects occur when a particular type or presentation of a news event is so striking that it affects viewers' memories of other stories they may have seen before or those they see after that story. For instance, Pfau et. al (2008, pp. 303-322) found that when viewers watched news stories that included combat or disaster footage, they experienced a retroactive loss of memory for stories before the footage but easily remembered in detail the stories that came afterward. Memory is also a variable in other types of news effects because it is related to accessibility, prior knowledge, mental schemas, and accumulated exposure.

People who have watched the same news events reported on different channels probably have an understanding of the framing concept. The frame is, in essence, the way a message is packaged. What words are used? What additional information is given? Which images and video clips are shown? All these questions and more must be answered during the preparation of a news broadcast. The answers will determine the nature of the frame – positive, negative, or somewhere in between.

Most news stories present some type of positive or negative bias towards the events and people in the story, even when the producers try to stay unbiased. This occurs because

human beings find it very difficult to state facts with complete impartiality of judgment. A mere choice of words – “murder” as opposed to “killing” – can make a difference. Both of these words would produce a negative reaction, but the negativity towards the word “murder” is generally greater than that towards the word “killing.” In many instances, producers may not be careful to keep their own biases – i.e., opinions, judgments, and assumptions – out of the news. Certain cable news networks are thought to have a “liberal bias,” while others seem to have “conservative bias.” Whether these networks are deemed good or bad is, of course, dependent on the viewer's own bias.

Two types of framing have been identified in communication research. Episodic framing results from news coverage based on individual events that exemplify issues, while thematic framing is based on collective information. A landmark study by Iyengar (1991, p. 49) showed that when subjects viewed episodic news, they tended to blame individuals for problems such as poverty or unemployment, but if the same information was presented in an aggregate form (national poverty or unemployment rates), subjects blamed outside sources such as the government. The fact that most news reporting is episodic can result in a “blame-the-victim” mentality and make it more difficult for the public to see issues as overall trends.

Most of these effects have been extensively researched, but the results have not been consistent in every case. One reason for the lack of consistency is the lack of shared definitions of constructs and a resulting lack of consistent measurements for some variables that are important in the consideration of news effects.

Eveland (2001, pp. 571-601) reported on the success of the cognitive mediation model as applied to three contexts: nonelection, off-year election, and presidential election periods. Based on cognitive mediation theory, information processing variables in individuals, such as prior knowledge and inductive or deductive reasoning styles, were predicted to mediate news effects such as knowledge gain. Eveland’s report also examined the effect of learning gratification, which encourages attention and elaboration, which are two kinds of information processing. These variables covaried and had direct positive effects on knowledge acquisition, based on the analysis of original data as well as on two sample

surveys. The study reflected the impact of both cognitive mediation and uses and gratifications theories.

Hwang et al. (2007, pp. 40-59) examined the interaction of priming and individual schemas in subjects that watched a presidential debate and a post debate analysis. The analysis framed the debate by focusing on either the candidates' policy positions or their debate performances, thereby priming the subjects to reflect on the emphasized characteristics. Results showed that the influence of priming was determined by interaction between the framing message and individual level factors of political knowledge and prior tendency to reflect.

A 2011 study by Valenzuela (Valenzuela, pp. 437-463) related the effects of issues in the news in relation to values already held by viewers. The results indicated that agenda-setting effects are stronger when the issues that are promoted fit the values and beliefs of the audience. There was a clear resistance to news media influences when issues and values did not match. This provided new support for the importance of individual characteristics in the effects of news media.

Eveland and Scheufele (2000, pp. 215-237) determined the effects of news stories on political participation, in the context of the knowledge gap hypothesis. Their results showed that television news viewing and newspaper reading interacted with education to predict political knowledge; that is, heavy news use, whether TV or print, was associated with greater knowledge apart from education level. However, political participation was predicted by newspaper use but not by television use. The relationship between education and political participation was stronger for higher newspaper use.

Using the knowledge gap hypothesis, Fraile (2011, pp. 163-184) determined the effect of news and education on knowledge when motivation, ability, and exposure were kept constant. The study was conducted in Spain from 2004 – 2006, and it asked the question, “Did the media add to the existing knowledge gap in the Spanish polity?” Unlike Eveland and Scheufele (2000, pp. 215-237), Fraile found that only one medium, newspapers, had any effect under these conditions. Increased exposure to political information did not increase the socioeconomic knowledge gap. The expected relationship between the level of education and political knowledge was weaker in heavy newspaper readers than in light

newspaper readers. These results (with regard to newspaper use) were consistent with those found by the previous study, and suggested that access to newspapers was able to compensate to a degree for lower education levels in determining political knowledge for this population. Fraile's study did not examine political participation.

Agenda-setting and priming effects have typically been studied by measuring exposure to news stories and correlating exposure with reactions to those stories. However, Chaffee and Schleuder (1986, pp. 76-107) designed an experiment to test their hypothesis that attention to the news (a personal variable) is more important than exposure (a message variable). They conducted a two-year prospective study in which teenagers and adults reported on their attention to newspaper and TV news. As a part of the study, the reliability and validity of the self-report measure were determined, and it was found to be highly reliable and a valid measure of the construct. Data analysis revealed that attention had a significant positive effect on knowledge increase that was entirely separate from exposure. This study was particularly important to television research, since prior studies focused on exposure alone.

Soroka (2006, pp. 372-385) reported on the influence of good news and bad news on news media coverage and public response. The specific type of news studied was about unemployment and inflation, which are measures of the economy in the U.K. By constructing a time series for both media coverage of the economic topics and poll data, Soroka was able to evaluate the symmetry or asymmetry of responses. Economic prospect theory of loss aversion suggested that responses would be asymmetric and negative news would have a greater effect. Analysis of the data showed that negative news produced more news coverage, and the negative news itself plus the increase in coverage combined to cause a much greater public response. Thus, Soroka showed that responses to good and bad news were asymmetric, with larger responses to negative news, which fit with the theory of loss aversion.

A study of the influence of affective tone (a message variable) on priming was conducted by Scheafer (2007, pp. 21-39), with the prediction that the tone of the message would a) contribute to second-level agenda-setting, b) affect the strength of priming, and c) influence political judgments. The empirical evidence, which consisted of content analysis of pre-

election news stories and subsequent poll data, was examined to determine if a relationship existed between the two variables, and, if so, what was the strength and direction of the relationship. Results confirmed that the evaluative tone of the media directly affected both first and second-level agenda-setting, indirectly affected priming, and directly influenced political judgments of the incumbent party. Interactions among affective tone, media exposure, national economic characteristics, and individual characteristics also were computed to check for hidden factors. None were found in this study.

McLeod and Detenber (1999, pp. 3-23) studied viewer perceptions of a news story based on the frame in which it was presented. A report on an anarchist protest was given, with three different levels of support of the status quo. In this study, framing had a clear influence on viewer reactions. More support of the status quo was associated with more criticism of and less identification with the protestors, less criticism of the police, and less support for the protestors' right to express their beliefs. Emphasis on maintaining the status quo also reduced estimates of protest effectiveness, public support, and perceived newsworthiness. These characteristics fit the concept of the status quo, which views change and those who want change in a negative light. Conversely, if the news story did not support the status quo, all of the above reactions were reversed. For example, less support of the status quo increased viewer identification with the protestors.

In 2006, Berinsky and Kinder (2006, pp. 640-656) performed an experiment to determine how certain characteristics of news stories can alter memory, issue salience, and policy judgment. The news story studied was an adaptation of newspaper reports on the crisis in Kosovo. Subjects were randomized into three possible conditions: first, the control condition, second, the pro-U.S.-intervention condition, and third, the con-U.S.-intervention condition. As expected, the facts subjects recalled varied according to condition, in a direct relationship. The importance of particular issues was also directly related to condition, but judgment of U.S. policy showed little difference, a result which was contrary to that which was expected (Berinsky & Kinder, 2006, pp. 640-656).

Pfau et. al. (2008, pp. 303-322) found that the inclusion of combat footage in a news report increased the emotional involvement of the viewers and decreased their support for the war (in this instance, the war in Iraq was pictured). This type of video also reduced the pride

viewers felt about the presence of U.S. forces in Iraq. These effects were found to be stronger in women than in men. The inclusion or lack of inclusion of combat footage is a decision made by TV producers and affects the frame of the story. Use of combat footage also has effects on memory and can therefore alter the applicability of the agenda-setting and priming aspects of these messages.

Iyengar (1991, pp. 11-16, 26-28) found that framing influenced perceived responsibility for problems such as unemployment and crime. When frames focused on individual cases or specific events, they were termed episodic frames; in contrast, political news placed in context was called thematic framing. One example of the difference between the two can be seen in coverage of drug use. In many instances, news stories about drug problems feature data on drug addicts (especially celebrities) evoking individual attribution, while others that talk about drug cartels, smuggling, and distribution routes are more likely to produce societal attribution (Iyengar, 1991, pp. 27, 32).

In 2002, Shah et. al. (2002, pp. 339-370) examined presidential approval ratings in the light of news coverage (news about the economy, presidential policy, and scandal), opinion polls over time, and a measure of economic success (estimates of real disposable income). News reports from 1993 to 1999 were analyzed for approval/disapproval in coverage of the three topics listed above. Using an ideodynamic model, they devised an equation that computes the overall persuasive force present in news media coverage, with its strength representing the likelihood that nonbelievers will be swayed to a different viewpoint. This equation explained changes in the president's approval rating, along with the framing of news stories concerning the economy, policy, and scandal.

Attribution effects were investigated further by Shah et. al (2004, pp. 102-120) in an experimental study of the complexity of subjects' responses based on a loss vs. gain frame and an individual vs. societal attribution frame. Previous research showed that most people avoid risk when presented with a gain-emphasizing frame but take more risks in the context of a loss-emphasizing frame. Based on theoretical considerations and empirical data, the authors expected complex interactions between the two frames, specifically that both the individual-loss combination and the opposing societal-gain combination would produce more complex cognition than individual-gain, societal-loss, or mixed-gain and mixed-loss

frames. These two expectations were partially confirmed; the individual-loss combination clearly produced more complexity than the individual-gain, and the societal-gain condition clearly produced more complex cognition than the societal-loss. However, when individual-loss and societal-gain were compared to the other four frame combinations, the relationship was less clear. Differences could be seen in the data, but these differences were not statistically significant.

Zillman et. al. (2004, pp. 58-81) examined the effects of lead frames using an experimental Internet news magazine mockup which included stories with five different frame conditions: no frame, conflict frame, disaster frame, agony of victims frame, and economic consequences frame. Self-selected exposure to each article was computed. Results indicated that the conflict frame and agony of victims frame were associated with increased reading times, while the disaster frame and the economic frame had little impact.

Druckman and Nelson (2003, pp. 729-731) studied the effects of interpersonal interactions, i.e., discussions of politics with family and friends, in modulating the strength of framing effects. In a three-condition experimental design, subjects viewed a news report and were placed randomly in a no discussion, unmixed discussion, or mixed discussion group. In the unmixed discussion group, all of the participants had similar attitudes prior to the study, whereas the mixed discussion group included subjects with differing attitudes. Druckman and Nelson found that subjects placed in a mixed discussion group after a news presentation were much less influenced by the framing and other characteristics of the presentation than were subjects in no discussion or unmixed discussion groups.

Druckman (2004, pp. 577-594) published the first study of priming effects using a real-world campaign and election. Content analysis of the Minnesota Senate campaign coverage during the 2000 election season was correlated with exit poll data to reveal that media coverage of the Senate campaign did prime voters (if they were exposed and attentive to the media) to base their voting decisions on the most salient issues and images. In this study, discussions with peers (family and friends) about the campaign tended to reinforce the primed issues; however, due to the real-world nature of the study and lack of randomization into groups, there was no distinction between unmixed and mixed discussions. Thus, in this study

Druckman (2004, pp. 577-594) provided general evidence to support his interpersonal interaction theory as well as the importance of priming alone.

Watt et. al. (1993, pp. 408-435) examined the agenda-setting effects of television news coverage in relation to memory decay. Using retrospective data (TV news archives and poll data) they studied the perceived salience of three issues – inflation, Iran, and the Soviet Union – and how salience changed over a 1,826-day period. Their prediction that perceived issue salience would be linked with declining TV coverage was found to be correct, illustrating that agenda-setting is easily affected by memory decay processes.

Kleinnijenhuis et. al.(2006, pp. 86-104) examined memory-based effects from a different perspective, the “sleeper effect” or effectiveness over time. Their research, based on the 2002 Dutch election campaign, looked at the effects of negative news on trust in political party leaders, using content analysis of news stories and seven panel surveys conducted at biweekly intervals. The data were analyzed for short-term as well as long-term effects on attitudes and behaviors that reflected trust as an intermediate variable. Results showed that trust in leaders was determined in part by the tone of the news, and levels of trust played a part in later voting. Polls in the nation conducted only a few days before the election indicated that one party would gain seats over another, but when the election was concluded, the actual gain and loss was reversed. The data regarding trust partially accounted for this unexpected switch in voters' choice. Kleinnijenhuis et al (2006, p. 101) explained this as a “sleeper effect” in that citizens accumulated the negative information over time but did not use it in making decisions about candidate preference until election day. The effects of media exposure over time were also examined in studies by de Vreese (2004a, 2004b) and Althaus and Kim (2006, pp. 960-976).

Perse (1990, pp. 17-36) examined the ability of adults to remember local news information based on their news watching motives, emotions while watching the news, and the complexity of the news stories themselves. High levels of information recall were associated with lower entertainment motivation, higher information gathering motivation, and more complex news stories. Perse also measured parasocial interaction of viewers with the newscasters, i.e., the feelings of trust and friendliness they had toward newscasters. She found that trust and friendliness were increased by higher levels of news realism and

experience of happiness while watching the news. Based on this study and others, Perse has focused on mass media from a uses and gratifications perspective, in which motivations and emotions are extremely important.

Using a complex variability model, Valkenburg et. al.(1999, pp. 550-569) conducted a study to determine the effects of frames on readers' thoughts about news stories and about recall of the facts. Subjects were placed in one of five groups: no frame (control), conflict frame, human interest frame, attribution of responsibility frame, or economic consequences frame. Two news stories were used with each frame. Analysis of the data revealed that the use of frames did not change according to the story, but there was an interaction between use of frames and the story, i.e., the economic frame was used more for the Euro story. The conflict and human interest frames were used more often regardless of the story. Recall of the facts was affected by both story and frame; the most significant effect was lower recall for the human interest frame. The authors suggested that this unexpected result might have come about when emotions evoked by the human interest story overwhelmed the facts themselves (Valkenburg, et al., 1999, pp. 566-567).

In 2004 de Vreese (2004b, pp. 194-214) published the results of a two-wave experiment to determine the effects of strategic news framing, with covariates of political knowledge and political efficacy, on political cynicism and support for issues. Strategic news framing was defined as news coverage that emphasized the motivations and personalities of the candidates, disagreements that occurred between parties, candidates, or voters, and extensive use of poll results. He noted that strategic news coverage was increasing, which in turn increased negative perceptions of political campaigns. The hypotheses to be tested included the following: 1) strategic news would increase political cynicism more than issue-based news, 2) strategic news would increase negative thoughts and decrease positive thoughts regarding the issues, and 3) strategic news would suppress voter support for the policies it described. Also, the effects of cynicism and policy support were examined for persistence over time. The results indicated that strategic news framing had a robust effect on cynicism, even when the effects of prior knowledge and political efficacy were considered. It also produced a statistically significant increase in negative thoughts, and a corresponding decrease in positive thoughts, although the latter effect was not significant. The third hypothesis, regarding policy support, was not confirmed by the results. The

increases in cynicism were persistent over time, although their magnitude decreased (de Vreese, 2004b, pp. 194-214).

Data from the two-wave experiment described above were subsequently analyzed to characterize the frame effects of TV news stories on three constructs – audience interpretations, relative salience of frames, and policy support (de Vreese, 2004a, pp. 36-52). Two versions of the experimental news program were presented to subjects, one with a conflict frame and the other with an economic consequences frame. In order to examine relative salience, the news story was separated into two parts, frame and core news facts. He hypothesized that audiences would react to a news frame by thinking about the news story in terms of the frame. Prior political knowledge and issue elaboration were identified as covariates. Additionally, the relative importance of the news frame and the effect of the frame on policy support were examined. The results confirmed the hypothesis, showing that subjects readily accepted the experimental frame as a guide to thinking about the issue. The covariates did not significantly affect this result. The importance of the frame was found to be as strong as that of the core facts, suggesting that news framing has a robust effect. However, as indicated by the prior de Vreese study (2004b, pp. 194-214), there was no difference in policy support between the two experimental frames.

A 2006 journal article by de Vreese and Boomgaarden (2006, pp. 317-341) examined the relationship among exposure and attention to news, prior knowledge, and political participation in a cross-national study. Content analysis of news stories and panel surveys were conducted over a period of time. Results showed that the positive effects of news exposure were greater than the negative effects, but the nature of the content was a covariate. Exposure and attention to media with high political content were directly linked to increases in knowledge of and participation in politics. Exposure to news outlets with less political content had little or no effects. This study supported a multivariate model of news effects.

A study of news media use during the 2006 U.S. midterm elections emphasized the role of exposure when voters are learning about political candidates (Wei & Lo, 2008, pp. 347-362). However, the authors did not examine exposure in a vacuum – instead, they investigated the relationships among motivations, exposure, attention, elaboration, and knowledge gain. As

might be expected, the five variables had complex relationships in which some co-varied directly or inversely, and when exposure was identified as the independent variable with the others dependent, it was shown to have both direct and indirect effects on attention, elaboration, and knowledge gain.

Althaus and Kim (2006, pp. 960-976) published a social psychological case study that examined opinion change during the 1990-1991 Persian Gulf crisis. The social psychology literature predicted that activation of personal schemas (knowledge) required both accessibility and applicability, and that applicability of priming messages to decision-making was reinforced over time. Results confirmed this expectation; the frequency of priming messages altered the accessibility (in the short-term) and the applicability (over the long-term) of personal schemas. Thus, priming effects increased as information accumulated.

In 2007, Chong and Druckman (2007b, pp. 637-655) published a study that investigated the ability of audience characteristics, message variables, and competitive environments to alter the magnitude of framing effects. Based on theoretical considerations, they hypothesized that frame strength, context (one-sided or two-sided), and the availability, accessibility, and applicability of individual schemas would interact to vary the effects of framing. Frame strength as a construct was determined by pretesting with subjects who were representative but who did not participate in the final study. The results indicated that the magnitude of framing effects was dependent on frame strength more than on context, and that competition altered but did not cancel out the effects of framing. Despite previous research emphasizing that individuals tend to favor issue frames that match their prior values (Valenzuela, 2011, pp. 437-463), Chong and Druckman found that a strong frame can change people's minds when compared with a weak frame. When both frames were strong, subjects moved toward middle ground positions. Weak frames had little effect except in the no-competition and less-knowledgable conditions.

Kleinnijenhuis et. al. (2007, pp. 366-384) examined the data from the 2003 election in the Netherlands (see Kleinnijenhuis, et al., 2006 above) to evaluate the usefulness of three different paradigms often thought to be mutually exclusive in the study of news effects. These paradigms were issue ownership, in which certain parties "claim" issues by emphasizing them in the party platform; real-world developments, such as a decrease in

unemployment or a drop in the stock market; and news about the successes and failures of the incumbents. Based on content analysis of Dutch media during the campaign and multiwave panel surveys, correlations were made between news in a given time period and the subsequent wave of the survey. This produced significant correlations for all three paradigms, suggesting that they are not mutually exclusive, but are complementary. The correlations remained after long-term individual characteristics, such as party identification, race, and education, were filtered out. The greatest effect was associated with news about successes and failures.

The two most studied theories of news effects are cognitive mediation theory and context/framing theory, each of which is referenced in multiple sources throughout this research. In fact, all of the modern theories of news effects have at least some studies to support them, even though there may be other studies that do not. One possible reason for this inconsistency is overlap between theories, as in the case of agenda-setting and priming theory, which includes concepts from cognitive mediation theory as well as framing theory. Also, definitions of constructs may vary among studies – one example is the concept of framing as it is used in political psychology compared to the different types of framing that are examined in sociology. One cannot assume that a given term used in one study means the same thing as the term does when it is used in another study.

The complexity of news effects theories has increased over time, and many of the news effects studies from the past decade focus on complex interactions among multiple variables. This is not surprising, since a similar pattern is seen in most sciences. As more detailed information is gathered, theories must be altered to account for those details. As changes in society occur, so must theories about society. Today, the rising importance of the Internet and the interactive communication it offers have caused significant changes in society, and researchers in news effects are beginning to alter their theories to explain those changes.

The impact of news web sites – whether they are associated with TV and news or are stand-alone news sources – is a rich field for current and future communication scientists. Social media, such as Twitter and Facebook, have revolutionized the gathering and dissemination of news stories in the last few years. For example, the Arab Spring, in which protests were

organized via social media and governments were unable to prevent the transmission of riot videos to news outlets, was a powerful example of these changes. Although the results presented here are important to a fundamental understanding of news effects, and they provide evidence about the still-popular news media of print, radio, and television, the need for more information is rapidly increasing. Many individuals today get more news from the Internet – perhaps via headlines on their Yahoo! email page – than from any other source.

Thus, research is expanding in new directions, but a consensus on some news effects is growing. For example, new research is discovering the power of other variables, such as interpersonal communications and individual characteristics, to modulate the influence of frames, but everyone agrees that framing is highly important to news effects. Reese (2007, pp. 148-154) presents framing as a bridging model based on a network analysis concept of frames embedded in a larger milieu, instead of as static characteristics of artificially individualized message/frame packages. This higher-level, symbolic viewpoint is particularly critical for Internet and social media research.

Future research should consider the definition of constructs and the reliability and validity of coding systems, so that results can be compared across studies. Constructs and coding for Internet variables is another area where consensus should be sought. At the same time, meta-level symbolic definitions for frames and other news effect variables should be developed to connect cross-disciplinary, cross-methodology, and cross-cultural studies of news media. In this way, the study of news effects in communication science can best keep up with rapidly changing technology.

In this research, we will concentrate our attention on the interaction between news effects and financial markets. In different parts of this study, we will find explanations for the effects on financial markets and not, say, politics or another realm of human life. The most important and simplest explanation for this is: for the purposes of our research, as well as by its design, financial markets are the most suitable subjects for study as they can nearly perfectly be represented in numbers. Numbers, as the reader of this research will see, are the major object of observation for us. Numbers are one of the most objective tools on a scientist's desktop. Hence, the research will observe the effects of news (expressed as

sentiment and consequently as numbers) on market price action (again expressed in numbers).

2.2 Media Effects and Market

There are a number of scientific theories, mostly developed in the fields of economics and finance, which directly examine the effect of human behavior and, more importantly for our purposes, the effect of news on the market. Also, considerable empirical research has been done on economics and finance in order to examine the real price/news relationship. In this chapter, we will take a quick look at these theories and empirical studies in order to explain why individual behavior and individual news consumption can have aggregated and global effects on price changes. In this thesis, we are not looking at news effects on individual level, but rather at news effects on aggregated level.

Scholars in political economics have worked to chart human behavior at least since the time of Adam Smith (Sassower, 2010, pp. 603-615). Early models were simplistic of necessity, since much information was lacking in the new sciences related to economics. A number of assumptions were made, including the basic assumption that human nature is rational. Thus, early economists created the concept of "homo oeconomicus" – or economic man – who acts rationally in his own self-interest in order to gain material possessions and wealth. Smith (2005, pp. 18-19) suggested that self-interest was the driving force of the marketplace, implicitly assuming that self-interested behavior was the same as rational behavior. However, he also believed that decision making was a struggle between "passions" and "an impartial spectator" (Levitt & List, 2008).

The word "oeconomicus" is the Latinized version of a Greek composite word meaning "household management:" οίκος (oikos) = household, νόμω (nomo) = management. In the ancient world, the basic unit of market transactions was the household (Stimson & Mulgate, 2008, p. 493). The word "homo" is familiar from the species name *homo sapiens* and simply means "man." O'Boyle (2007) writes, "To date, we have clearly identified *Maffeo Pantaleoni's Principii di Economia Pura* published in 1889 as the earliest use of *homo*

oeconomicus in print." Earlier (1826, 1847) uses of *oeconomicus* alone indicate that the name existed in German economics literature in the first half of the 19th century.

The concept of self-interest (as opposed to selfishness) was lauded by Aristotle in his *Politics* (350 B.C.E.). He considered it a part of human nature and declared that altruism must be preceded by self-interest, since a person could not give to others without private property from which to give. However, several 20th century authors, especially Finley, have posited that none of the ancients, including Aristotle, addressed economic principles, but rather moral principles (Stimson & Mulgate, 2008, pp. 492-493).

The mercantilists of the 16th – 18th centuries deviated somewhat from the vision of homo oeconomicus, since they were more concerned with commercial, taxable activities that would be beneficial to the state as a whole. The state, whether a monarchy, commonwealth, republic, or other type, was the basis of the economy during that time. Thus, it is not surprising that colonialism, foreign trade, exploration, and regulation, as well as maintenance of a standing army, were the primary goals of economic life (Stimson & Mulgate, 2008, p. 496). Mercantilism, in many ways, subjected the interests of laborers to that of the state, in particular the wealthy and nobility. Some political economists, however, sought to modify mercantilism to a "gentler" form; Scottish writer James Steuart advocated regulated prices and taxation in order to prevent the rich from hoarding all of the wealth and goods, instead encouraging them to turn their wealth into investments that would be beneficial to all. Steuart's ideas were not well-received, partly because no one wanted to give up their wealth, but also because David Hume and the Scottish Enlightenment thinkers, whose theories laid the groundwork for Smith's classical economics, believed the same aims could be achieved through a self-regulating market, considered to be much more practical (Formaini, 2003; Stimson & Mulgate, 2008, p. 497).

Since then, some economists have developed a *homo oeconomicus* who "can think like Albert Einstein, store as much memory as IBM's Big Blue, and exercise the will power of Mahatma Gandhi"(Sassower, 2010, p. 605), which is completely different from human reality. Real people forget, judge poorly, misinterpret, and are significantly affected by emotional processes when they make decisions. H. oeconomicus "can effortlessly solve even the most difficult optimization problems," while real humans, based on behavioral

economics, are not rational and oftentimes are unpredictable (Levitt & List, 2008, pp. 909-910).

Two facts are evident: one, the field of microeconomics is exploding as it interacts with other disciplines, including some that are similar (sociology) and others that are quite different (neurophysics); and two, research is still lagging behind theory, but it is beginning to catch up. The future of microeconomics lies in its ability to model – to explain and predict – human behavior in the context of money and possessions, as well as those intangible "goods" such as happiness (Cullis, Hudson, & Jones, 2011) and satisfaction.

The second important concept developed in economics is rational choice. Rational Choice Theory (RCT) is derived from the earlier "homo economicus" theory , which stipulates that economic man is rational and entirely led by self-interest (O'Boyle, 2007). This concept was implicit in *Wealth of Nations* by Adam Smith and in later writers of the classical school, particularly John Stuart Mill. In the 19th century, Bentham developed the concept of utilitarianism, in which individuals take action to maximize overall happiness. Daniel Bernoulli had described a prototype of *marginal* utility ("marginal" meaning "in small amounts") in the early 18th century, but his ideas were not developed further until the mid to late 1800s. Two important mid-19th century authors, Jevons and Menger, extended Bernoulli's ideas to explain how individuals rank choices, why they use rankings in decision making, and the contribution of added factors such as costs and potential tradeoffs to marginal utility (March, 1978, pp. 587-608).

Rational Choice Theory grew in power with the addition of expected utility or rational expectations. These concepts were first delineated by von Neumann and Morgenstern (see below). The equilibrium hypothesis began with Walras (Arrow, 1959) and continued with American economic theorists in the early 20th century. Beginning in 1955, Simon developed the concept of "bounded rationality," which acknowledged mathematically the importance of constraints (of various types) as well as preferences in rational decision making. Finally, game theory, or interactive decision theory, improved the mathematics of RCT and brought it closer to practical applications (as opposed to purely theoretical considerations) because it stipulates that actors consider the potential choices of other actors when making their own choices. That is, no one makes a choice in isolation (March, 1978, pp. 587-608).

In Rational Choice Theory (Cooter & Ulen, 2000, pp. 10-16), a number of concepts and principles require definition. For example, RCT stipulates that any "actor," whether an individual, small business, or nation-state, seeks to maximize something – happiness, profits, common welfare, etc. (Green, 2002). When making a choice, the actor examines the alternatives and ranks them according to their potential for providing that which is being maximized. In theory, the actor uses all information available to determine the rankings, but (as explained below) in practice this is impossible. A "utility function" describes the ranking system (Green, 2002), while a "feasibility constraint" is the mathematical representation of all restrictions placed on the choice (e.g., money available for a purchase). The "equilibrium" is the balancing point of the mathematical equation, and it represents the interactions of actors such that everyone is able to maximize desired quantities.

Economics often focuses on efficiency (Cooter & Ulen, 2000, pp. 16-17), but this term can have different meanings. Production efficiency is defined as the state in which the production process requires only the amount of inputs it is currently using, and given the inputs, it cannot produce more. Another kind of efficiency occurs when actors in a scenario cannot change their choices without damaging the maximization of at least one other actor.

As indicated above, RCT states that actors make decisions based on a "utility function," a mathematical statement which relates the rankings of goods and services to the choices made by the actor. Constraints on choice, or obstacles, include factors such as time, energy, knowledge, culture, and income. The resulting function based on these constraints is therefore multi-dimensional and unique for each actor. To achieve maximization, where "marginal cost" is equal to "marginal benefit," economists may construct utility functions with constraint functions and find the intersection of the two equations (Cooter & Ulen, 2000, pp. 20-21)

A fundamental principle of RCT is the relationship between price and purchasing – as a product's price increases, the individual is less likely to purchase it, and vice versa. This relationship, the law of demand, usually is expressed as a nonlinear function (curve) with a slope that is related to the concept of "elasticity." This quantity is calculated by dividing percentage change in quantity purchased by the percentage change in price. The most important factor determining the elasticity is the relative presence of goods that can be

substituted for the relevant item. The number of substitutes available is directly proportional to the elasticity. Another factor is time – a longer time period increases elasticity as consumers have more time to adjust their buying preferences.

Rational Choice Theory, which achieved its status as the dominant theory in microeconomics during the mid-20th century, nevertheless has been criticized by many social scientists for its invalid assumptions and failure to match real-world data. A few researchers have proposed alternative theories (Gibson, 1997; Loomes & Sugden, 1982), but most have merely criticized RCT without suggesting ways to improve it. According to Jacoby, many proponents of RCT explicitly state that the validity or lack of validity of assumptions is unimportant as long as the theory serves a purpose in understanding real life occurrences. Ironically, this reflects rational choice on the part of theoreticians themselves – that is, they select a theory based on how well it achieves their goals rather than on the intrinsic qualities of the theory. However, as mentioned above, RCT is often unsuccessful at predicting what consumers and other actors will do. Instead, it serves best as a normative theory, expressing an ideal state which, like ideal gas laws and other "perfect" mathematical forms which do not really exist, serves primarily as a framework to illustrate concepts and how they can interact.

Fama (1970, pp. 383-417) writes in his landmark article, *Efficient Capital Markets*, that an efficient market is one "in which prices always 'fully reflect' available information." Thus, when news is released (such as interest rate changes, announcements of mergers, changes in credit ratings, consumer sentiment, etc.) that has the potential to affect the markets, any changes caused by the news occur swiftly (Malkiel, 2003, pp. 1-47).

The above definition is not specific enough for empirical testing – one must first determine what the phrase "fully reflect" means (Fama, 1970, p. 384). This means that a mathematical formulation of price formation must be discovered. Fama states a general equation for market equilibrium which is founded on expected returns, such that the equilibrium, based on some set of information, is determined by risk; "different theories would differ primarily in how 'risk' is defined."

However, since the efficient market hypothesis itself does not require any statement of expected returns, there are other ways to sum up the overall distribution of possible returns. The validity of using expected returns is assumed rather than proven, but assumptions are

part of any hypothesis, and therefore it is acceptable as long as one remembers that it is merely an assumption (Fama, 1970, p. 384).

Expected returns form a distribution; equilibrium expected returns are the level at which expected returns "fully reflect" the information set. If the model describes equilibrium based on expected returns, and on fully reflected information, it is a "fair game" model. According to Fama, there are two important special cases of the fair game model, namely the submartingale and the random walk (Fama, 1970, p. 385). In the submartingale, the expected value of price at the end of the next period, based on the information set, is equal to or greater than the current price. Thus, expected returns based entirely on the information set cannot be negative (Fama, 1970, p. 386). On the other hand, the random walk model states that 1) successive one-period returns are independent and 2) the returns are distributed exactly the same. Another way to describe the random walk is "a price series where all subsequent price changes represent random departures from previous prices" (Malkiel, 2003).

In practical terms, this means that no analysis can produce a portfolio that will perform better than buying and holding an index fund such as the S & P 500. According to Fama (1970, p. 387), empirical testing of the random walk model *without* the independence requirement gives stronger support than testing *with* independence, but this is not a problem since efficient market hypothesis does not require independence. Thus, it is implicit in the efficient market hypothesis that neither technical analysis (study of past stock prices) nor fundamental analysis (study of earnings, assets, etc.) can provide the investor with an "edge" over a buy-and-hold strategy, using a stock portfolio or mutual fund in which the risk is similar (Malkiel, 2003, p. 3).

There are three forms of efficient markets, as follows: 1) weak efficient markets, in which the available information is only historical prices, 2) semi-strong efficient markets, in which publicly available news is included as information, and 3) strong efficient markets, which include proprietary or "insider" information (Fama, 1970, p. 383). Campbell, Lo, & MacKinlay (1997, pp. 29-31) describe three versions of the random walk hypothesis based on correlations and distributions of the returns: 1) independent and identically distributed returns, 2) independent returns, 3) uncorrelated returns. Because the martingale does not

require independence, it can qualify as the third type of random walk, even if price has "clusters of volatility and tranquility" (Barnett & Serletis, 2000, p. 4).

The community of theoretical economics is still divided about the utility of the efficient market hypothesis. The assumptions it requires, such as rational actors and instantaneous reaction to news, are idealistic and therefore cannot be found in the real world. Alternative models have been suggested, such as mean reversion, nonlinear dynamic systems, and the Capital Asset Pricing Model, but none of these are widely accepted. The incorporation of psychological principles into economic theory has begun in the field of behavioral finance, but it requires considerable changes to models, since it negates the "rational actors" assumption completely.

Behavioral finance is the study of economics using the tools and theoretical approaches of psychology and social psychology. Emphasis is placed on the internal states, including emotions and desires, of individuals who make choices about money and other assets. It stands in contrast to Rational Choice Theory, which assumes that all actors (persons, organizations, corporations, states) make economic choices rationally, based on all the available information. Along with the Efficient Markets Hypothesis, which states that stock prices react immediately to news and are always at the appropriate values, RCT makes up the foundation of Modern Finance Theory (McMahon, n.d., pp. 1-36). This was the dominant theory of economics since the early 20th century.

However, empirical research increasingly indicated the inadequacies of this approach for explaining the realities of finance. Anomalies such as excess market volatility and non-rational decision making indicated that RCT and EMH did not explain all of the real world of finance (Chaarlas & Lawrence, 2012, pp. 32-44). MFT is a *normative* theory, not a *positive* theory; that is, it is an ideal state that is not supported by research. The theories of behavioral finance, such as prospect theory, were devised to explain experimental results. Even so, many economists have clung to MFT and resisted attempts to integrate psychology/social psychology (Lindenberg, 1985, pp. 244-255), nonlinear dynamics (Mauboussin, 2002, pp. 8-16), cycles and patterns (Andreou, Pittis, & Spanos, 2001, pp. 187-220), and neuroscience (Dow Schull & Zaloom, 2011, pp. 515-538) into economic theory.

The earliest publication concerning behavior and finance was Selden's *Psychology of the Stock Market* published in 1912 (Sewell, 2007, p. 1). Selden was far ahead of his time; it would be four decades before another article on the subject appeared. Herbert Simon (1955, pp. 99-118), who received the Nobel Prize in economics (1978) for his work on organizational decision making, published "A Behavioral Model of Rational Choice" in 1955. This paper examined the role of the organism in the context of RCT and concluded that rationality is constrained by environmental as well as internal facts, such as the lack of or the inability to process information. His model was later termed "bounded rationality" (Simon, 1955, p. 118). In 1964, Pratt examined utility functions, but not merely from a "rational" point of view; instead, he also considered the anomalies of individual choice under risk aversion and risk as a part of total assets. Tversky and Kahneman (1974, pp. 1124-1131) provided explanations of three heuristics, or experience-based decision making processes, that people use when making judgments in the presence of uncertainty: 1) availability – determining frequency or probability by how easily instances can be brought to mind (Tversky & Kahneman, 1974, p. 1127); 2) anchoring and adjustment – in numerical problems, people estimate by starting at a known value (anchor) then adjusting (Tversky & Kahneman, 1974, p. 1128); and 3) representativeness – individuals determine the probability of an event A belonging to a process B by how much A resembles B (Tversky & Kahneman, 1974, pp. 1124-1125).

In 1979, the same psychologists, Kahneman and Tversky, published studies of the methods human beings use when making choices about risky situations, and their findings led them to develop prospect theory as an alternative to expected utility theory, also known as rational choice theory (Daniel Kahneman & Tversky, 1979, pp. 263-292). They observed that individuals behaved contrary to utility theory in three ways: 1) expectation, 2) asset integration, 3) risk aversion. They overweight outcomes that are certain, as opposed to those that are merely probable; this is called the certainty effect (Daniel Kahneman & Tversky, 1979, pp. 265-269).

Research into behavioral finance has grown rapidly since its official beginning in 1985. However, each new study suggests further research, whether to confirm results, expand them, or add something else. The fields of psychology and social psychology continue to have much to teach the field of economics.

In research conducted about inflationary news effects on high-frequency stock returns, Adams, McQueen et al. find that inflation news influences intraday stock returns. Furthermore, Adams, McQueen et al. establish that the stock-inflation news relationship is state dependent. According to their research, the strength of this relationship is stronger for larger stocks when the economy is strong and the news is bad (Adams, McQueen, & Wood, 2004).

Almeida, Goodhart et al. examine the impact of macroeconomic news on exchange rates using high frequency data for DEM/USD. According to their findings, the impact of macroeconomic news on exchange rates is strong and quick. They associate this impact with the successful monetary policy of respected authorities. However, they also observe that this impact is quantitatively small, and the overall effect of the macroeconomic news on lower frequency exchange rate changes decays quite rapidly towards insignificance.

Furthermore, Almeida, Goodhart et al. note that despite similar features of the news effects of German and U.S. announcements, there are some interesting discrepancies between the two groups. German announcements in particular tend to be incorporated in the exchange rate more slowly than news from the U.S. This, they explain, is mainly due to differences in timing arrangements. Additionally, the impact of the exchange rate is quantitatively smaller for the German announcements. Almeida, Goodhart et al. argue that the explanation of the set of coefficients showing the markets' response to unexpected news is that these are driven by their interpretation of the monetary authorities' reactions. These reactions affect short-term money market interest rates (Almeida, Goodhart, & Payne, 1998).

In his normative work, Veronesi argues that when times are good, a bad piece of news makes investors increase the discount over expected future dividends in order to bear the risk of higher uncertainty. As a consequence of this behavior, the price reaction due to bad news in good times is greater than the reduction in expected future dividends. Furthermore, a good piece of news in bad times tends to increase the expected future dividends, but also increases the discount investors require to hold the assets (Veronesi, 1999).

Andersen and Bollerslev find that high-frequency returns contain extremely valuable information for the daily measurement of volatility. The intraday returns also reveal there are significant long-term memory features in the return dynamics (Andersen & Bollerslev,

1998). In later research, Andersen and Bollerslev et al. establish that news affects exchange rate changes (Andersen, Bollerslev, Diebold, & Vega, 2003).

Bauwens, Ben Omrane et al. study the impact of news announcements and private information on the volatility of Euro/dollar Forex returns. They find a significant impact of both scheduled and unscheduled news announcements, and focus on the reaction of volatility in the pre-announcement periods. Additionally, Bauwens, Ben Omrane et al. take into account Forex private information proxied by the level of depersonalized market activity. Their results show that the release of scheduled news leads to the pre-announcement rise in volatility. They also note that the increase in volatility does not occur in the case of announcements of unscheduled news, except for rumors of central bank intervention. Intriguingly, the above study cannot detect significant volatility increases or decreases in the post-announcement period (Bauwens, Ben Omrane, & Giot, 2005).

Boyd, Hu et al. observe that on average stock prices rise on bad labor market news during expansions, and fall during contractions. Also, on average, bond prices rise on bad unemployment news but do not respond significantly during contractions (Boyd, Hu, & Jagannathan, 2005).

Conrad, Cornell et al. test the hypothesis that stock prices respond more strongly to bad news than good news when stock prices are high. Their findings support the hypothesis. In particular, they conclude that the stock price response to surprises about negative earnings increases as the market level rises. They also observe that the stock price response to positive earnings surprises decreases as market levels rises. At the same time, the difference between bad news and good news response coefficients increases as the market level rises (Conrad, Cornell, & Landsman, 2002).

Faust, Rogers et al. examine the joint behavior of exchange rates and zero coupon interest rates using a long span of high-frequency data. They find that the effect of price surprises on interest rates declines over their sample period, and that the effect of trade balance surprises on exchange rates also declines. In addition, they note the variation in the effects of surprises on non-farm payroll.

McQueen and Roley observe that market response to macroeconomic news depends on the state of the economy. They note that news of higher-than-expected real activity when the economy is already strong results in lower stock prices, whereas the same surprise in a weak economy is associated with higher stock prices (McQueen & Roley 1993).

Melvin and Yin suggest that quote frequency and volatility of the mark/yen/dollar exchange rates are affected by the rate that public information arrives on the market (Melvin & Yin, 2000).

Laakkonen and Lanne study the relationship between the asymmetric news effects on exchange rate volatility and the state of the economy. In their research, they measure the impact of U.S. and macroeconomic announcements on the volatility of high-frequency EUR/USD returns. They find that macro news increases volatility more in good times than in bad times. Yet negative news has stronger effects in good times than bad times, and positive news effects do not seem to depend on the state of the economy (Laakonen & Lanne).

In his theoretical work, Veronesi addresses the issue of the impact of macroeconomic news on markets. He also discusses the possible different impacts of macroeconomic news in various business cycles (Veronesi, 1999). He suggests that in different states of the economy - that is, in different business cycles - the effect of information on market instruments can vary. Hence, the impact is asymmetric.

Veronesi introduces two different states of the economy in which this asymmetry can be observed. This process can be described as two-state regime switching, i.e., “low” and “high.” “Low” means economic recession, and “high” means economic expansion.

According to Veronesi, if the economy is in expansion and bad news arrives, the expected future asset value of the investor decreases. risk averse investors require additional returns for bearing additional risks and therefore require an additional discount on the asset price. Because of this action, the asset price drops more. But if the economy is in recession and good news arrives on the market, the expected future value for investors increases. However, if uncertainty increases, the price does not respond as much as it would without the additional uncertainty concerning the future state of the economy (Veronesi, 1999).

While there is rich and interesting literature about the implications of the asymmetric effects of good and bad news on markets (Andersen, et al., 2003), the empirical studies assessing the asymmetries in the news effects on the business cycle still need further development. Yet several different attention-grabbing studies are available on the issue.

In their early study, McQueen and Roley examined the effect of macro news on the S&P 500 price action, and measured the business cycle with industrial production output data. In their research, unlike Veronesi (1999), they use three business cycles: “high,” “medium,” and “low.” The study indicates that good news results in lower stock prices when the state of the economy is “high,” whereas the same news is associated with higher stock prices when the economy is weak (McQueen & Roley 1993).

Adams and McQueen detect similar effects in a later study. In this, the researchers use the intraday stock index data and study the effect of PPI and CPI on stock returns. They find that response to the news is strong when the economy is strong and when news is bad (Adams, et al., 2004).

Like McQueen and Roley, Boyd, Hu et al. take a closer look at S&P 500, but in this case they examine the implication of unemployment rate announcements on price action. They find differences between good and bad economic times, and use NBER business cycle definition in order to identify the markets’ state.

Boyd, Hu et al. also find that news of rising unemployment is, paradoxically, good news in times of economic expansion, and bad news during economic downturn. As well as S&P 500 performance, their study analyzes the implications of bad and good news on bond markets. According to their findings, bond prices respond to bad unemployment reports during economic expansion with rises, but the same reports have no effect on the markets during recession (Boyd, et al., 2005).

In a later study, Andersen and Bollerslev come up with very similar results (Andersen & Bollerslev, 1998). But unlike Boyd and Hu, their study analyzes more asset classes in different countries. The study finds that the bond market is insensitive to news announcements, whereas the stock market does react. Good news has a positive impact on price action during bad times, and a negative impact in good times (Andersen & Bollerslev, 1998).

Faust, Rogers et al. look at movements of foreign exchange rates in the U.S. on one hand, and foreign terms structures on the other. But they find very little evidence of asymmetric news responses (Faust, Rogers, Wang, & Wright, 2007). According to Conrad and Cornell et al., who concentrate their attention on stock market performance rather than on the business cycle, bad news has a stronger effect in good times than in bad times, and good news has nearly no effect in bad times (Conrad, Cornell, et al., ????).

Individual behavior and individual media behavior have great potential to significantly affect developments in the markets in terms of price action, volume increase or decrease, and so forth. These developments are observable at an increased pace. This, I argue, is a direct effect of the ongoing mediatization process.

2.3 Mediatization

Mediatization is the process by which media forces begin to dominate an area of interest, such as politics or religion, and set up a reciprocating system in which individuals and organizations adapt to the media and vice versa. Hjarvard (2008, pp. 105-134) defines mediatization as "a double-sided process of high modernity" in which the media is both independent of and integrated with politics, work, family, religion, etc. Media logic – the institutional and technological *modus operandi* of media – is the independent aspect of mediatization in this model, while the integrated aspect of the media serves to negotiate between cultural institutions and aid in their interaction (Stig Hjarvard, 2008, pp. 109-110). The majority of researchers have examined the mediatization of politics, but many other parts of society are mediatized as well.

According to Hjarvard (2008, p. 106), the first media researcher to use the term "mediatization" was Asp, who defined the mediatization of political life as a process in which a system of politics is shaped by actions of the media. He noted that politicians and political parties adapt their behaviors to account for the media. For example, politicians deliberately create "sound bites" – short, pithy statements that are easily used in network news shows with tight time constraints – in order to increase the likelihood that they will be mentioned

in the news. Politicians who do not carefully control their outward personas may find that the media controls them.

Mazzoleni and Schulz (1999, pp. 247-261) described mediatization as "the problematic concomitants or consequences of the development of modern mass media." This view of mediatization looks to future effects rather than at present phenomena, and has a negative bias by definition. They characterize mediatized politics as having lost its independence, relying on the media for its communicative functions. This does not mean political actors are controlled by the media, only that the media has considerable influence over them. Similarly, Jansson (2002, pp. 5-31) examines the mediatization of culture as a process that spreads local, regional, and national culture to larger areas. An example of this is the viewing of American cable news networks in areas such as India or the Philippines, which have their own strong cultures but are inevitably influenced (to a greater or lesser degree) by the media of other cultures (Jansson, 2002).

The media can be separated into mass media (e.g., TV networks), micro-media (e.g. email, mailing lists) and middle media (e.g., organizational sites) (Bentivegna, 2006, p. 338). Information Communication Technologies (ICTs) have changed consumers into producers – anyone who owns a camera phone can take pictures and possibly videos of news events as they are happening, sometimes long before "official" journalists can arrive. The images can then be emailed to news organizations, videos can be posted on YouTube, etc. Thus, ICTs have become both agents of change and objects of change, providing the street for a two-way interaction between media and the consumer (Bentivegna, 2006, pp. 340-341). ICTs are changing the very landscape of the media.

The mediatization of politics has been extensively studied and makes up the bulk of mediatization research. According to Cohen et al. (2008, pp. 1-14), politicians believe the media is powerful, and as a result they tailor their words and actions to suit the media. The researchers tested the "influence of presumed influence" using survey data from Israeli members of the Knesset (MKs), parliamentary press rankings of MKs' media motivations, and data on MKs' political activities and appearances on the news. Results showed that presumed media influence on the public was directly related to media motivation and effort, but presumed media influence on other MKs was not. After controlling for other variables,

media motivation and effort were shown to affect news coverage positively. Finally, media motivation and effort was significantly associated with parliamentary activity (Cohen, et al., 2008, pp. 5-8).

Kepplinger (2002, pp. 972-986) found a unique opportunity to study the relationships between politics and mass media in the changing face of media in Germany since World War II. Circulation of daily reports and weekly news magazines has tripled or quadrupled, while the number of radios also quadrupled, and TV ownership grew from none into the tens of millions. But even more important, the party press and church newspapers have all but disappeared. More people get their political information from the media than from friends and family, and as has been observed by other authors, politicians responded to this change by molding their actions in order to seek media attention. This study analyzed the mediatization of political actions by members of the German parliament from 1951- 1995. Kepplinger (2002, pp. 973-974) hypothesized that GP members adapted to mass media in general and regional media in their voting districts by increasing publicity-attracting activities, making statements with high news value, and producing press releases and other written documents that are easily transmissible to the media. He also hypothesized that there would be a reciprocal effect on media coverage as politics is increasingly mediatized.

Results of the study showed that the German Parliament spent more time on information-related activities as the role of media grew over time. This process had two peaks, one in the 1960s, and another in the 1980s. Even parliamentary procedures changed, showing influence by the media (Kepplinger, 2002, p. 977). Political articles were triggered by events or statements much more often than by issues. Since politicians made more statements (both oral and written) over time, the number of articles triggered by statements grew tremendously. Initiators of statements covered by the media were almost all politicians, rather than members of organizations or individual citizens. Since the media responded most to declarations and demands for action, politicians began making more of those statements (Kepplinger, 2002, p. 982). These findings illustrate the two-way relationship between media and politics in the mediatization process.

Isotalus and Almonkari (2011) noted the importance of the media for political parties and their leaders. Voters use information about political candidates and leaders to form opinions

and make choices; this information is by necessity transmitted over the mass media. In order to investigate the criteria the press uses to evaluate party leaders, Isotalus and Almonkari (2011, p. 5) collected data from the press (articles about political leaders in two Finnish daily reports and two afternoon reports) over a period of six months. In addition, interviews with the leaders of eight political parties were conducted, examining themes of political leadership, processes of change in leadership, and communication/media.

Results showed that the press used five major criteria when evaluating politicians: 1) professional competence (especially experience), 2) communication skills (verbal, non-verbal, and specific media skills), 3) maintenance of political relations (within party, between parties, with the public), 4) characteristics and behavior (positive, negative, or neutral), and 5) inspiring confidence (credibility, lying, trust, and impeccability) (Isotalus & Almonkari, 2011, p. 6). Party leaders were also asked to describe what makes a good political leader, and their answers fell into nine categories: communications skills, leadership, constant availability, high stress tolerance, courage to try new solutions, ideological understanding and expression, issue competence, trend perception, and a vision for the future. Professional competence and communications skills appeared in both sets of data, but in interviews, the leaders did not discuss personal characteristics as much as the media did. Two categories found in the media – political relations and building confidence – did not appear at all in the interviews (Isotalus & Almonkari, 2011, p. 10).

Bentivegna (2006, pp. 331-345) studied the consequences of Information Communication Technologies (ICTs) in producing negative evaluations of politics as a whole and politicians in particular. When mediatization of politics first began, politicians readily accepted it. It was believed that ICTs would save representative democracy since the control of government by the governed increases as more information becomes available. Direct access to information also boosts citizen participation in political processes, while decreasing the importance of intermediaries such as parties and unions (Bentivegna, 2006, p. 335). In a strong democracy, ICTs are important but do not endanger representation. Political parties, particularly those that are well-established, tend to use ICTs simply to speed up the activities that they did in the past. New parties, as well as other types of organizations, can use ICTs to a much greater extent, developing a number of “public spheres” – symbolic spaces that contain shared thoughts, feelings, values, opinions, etc. – in cyberspace as well as physical space. Some

corporations have used the Internet to create their own public sphere, but organizations generally fight to restrain takeover by private interests.

Public spheres established by citizens and citizen organizations on the Internet can be regarded as sub-political organizations, in which ICTs have a significant role (Bentivegna, 2006, p. 340). ICTs have been used to mobilize people, to provide independent media, and even to create transnational networks. An example is the Arab Spring of 2011, when social media networks were used not only to organize but to share information with other protestors, such as how to handle the effects of tear gas. Using ICTs to connect to the Internet, people in the groups developed a sense of community, which was a great contributor to their success and especially their morale (Skinner, 2011). ICTs give more power to citizens, but they can also fragment politics and other cultural arenas as part of the general increase in individualization (Bentivegna, 2006, p. 341).

Bos et al. (2011, pp. 182-206) evaluated the mediatization processes by which public perception of right-wing populist leaders are shaped. They stated that, theoretically, right-wing populist party leaders are more dependent on the media for their public image, because they are relatively new and require mediatization to boost their popularity. Thus, they seek attention from the media through image management, adaptation to media logic, and defying the existing order with “abrasive language, public protests, and emotive issues.” A populist leader must therefore balance between being unusual and being authoritative.

In order to check these theoretical positions, Bos et al. (2011, p. 183) examined the relationship between media coverage and popular opinion of two Dutch right-wing populist leaders and four mainstream party leaders. Their stated research question was “To what extent are perceptions of right-wing populist party leaders, in terms of their perceived effectiveness and legitimacy, affected by the media coverage of these leaders, in terms of prominence (media attention), populism (populist style and rhetoric), and authoritativeness (knowledge about important topics)?” They also wanted to know if media affected the right-wing populist leaders the same way as it did the mainstream party leaders (Bos, et al., 2011, p. 189).

Two kinds of data were studied: a two-wave panel survey which assessed public opinion of party leaders, and content analysis of media coverage of these leaders. Surveys were

conducted two months before the election and the day before the election to determine the dependent variables, the effectiveness and legitimacy of leaders. The independent variable was “media exposure,” measured on a five-point scale (Bos, et al., 2011, p. 190), and control variables included party preference, Internet campaigning, social interactions (discussions with family and friends) and ideological stance (left-right and views on immigration).

Results of this study supported the general hypothesis that the media affected the image of political leaders in both positive and negative ways. For instance, linking immigration with a populist party had a negative effect. This goes against the common saying “any publicity is good publicity” (Bos, et al., 2011, pp. 196-197). However, there was a clear effect on prominence: more publicity made a leader more prominent, which increased the party’s legitimacy and its likelihood of getting seats in parliament. Finally, a surprising result of this study was that populist rhetoric and style, while positive for right-wing populist leaders, had a negative effect when adopted by mainstream political leaders. The authors suggest this may be because the audience views the rhetoric as insincere (Bos, et al., 2011, p. 198).

One form of political mediatization is branding, which is actually a marketing concept that has been co-opted by political parties and candidates. In the past two decades, politicians increasingly have turned to marketing experts for help with their election campaigns. For example, former U.K. Prime Minister Gordon Brown hired David Muir, a well-known author and branding expert, to guide his public relations staff (Adolphsen, 2008, p. 2). Other Western political entities have followed suit, and during the 2008 U.S. presidential race, the Obama campaign was explained by some newscasters as using a “corporate branding” framework. Adolphsen (2008) asked several questions about political branding by the Obama campaign: 1) Are branding qualities visible in political communications? 2) Can they be identified and measured? 3) Is branding a new quality of communication? 4) what theoretical context is best for a study of branding?

Branding must first be defined. Branding is not what a product is but what consumers perceive it to be. For example, a beer commercial that features attractive young men and women relaxing on a beach can create an association between the beer brand and leisure/attractiveness, even though the beer is still just beer, and no one will end up on the beach just by drinking it! Branding refers to any organization’s activities aimed at the

creation and encouragement of a distinct brand image in consumers' minds, and by necessity it will involve value-laden/emotional narratives (such as pleasure at the beach), multi-channel orientation (same brand attributes in all communications formats), and trust-building (consumers must trust the organization as a credible source for information about the branded object) (Adolphsen, 2008, pp. 5-6).

Scammell (2007, pp. 176-192) examines the re-branding of Tony Blair prior to the 2005 U.K. general election and describes how the brand concept and associated research techniques are now used in political marketing. She states that "spin" was the chief technique used in political marketing during the 1980s and 1990s but that has since evolved to become a larger, more encompassing version of image management. Additionally, she argues that the new branding is a sign that political communication has begun to move away from a mass media model to a consumer model.

Aside from politics, peace and war have been studied most by mediatization researchers. El-Ibiary (2005) examined reports of the U.S.-led Iraq conflict on each side: Al-Jazeera news network and CNN. She found that video images contributed to the potential of their narratives to become an important part of war strategy, as well as affecting war policy itself. Reports from the two networks were completely different; while U.S. and UK media produced patriotic news on coalition victories, the Arab news showed relentless death and destruction. Journalists from all sides were buffeted by censorship and danger from the belligerents. However, video images continued to show the pure facts of what happened, although even videos were censored by selection and cutting (El-Ibiary, 2005). Due to the practice of "embedding" journalists with military units, it was difficult for journalists to view what they saw with an unbiased eye – they would naturally be in favor of those who were protecting them. Some of the video images were clearly staged, such as pulling down the statue of Saddam Hussein and saving Private Jessica Lynch (McQuail, 2006, p. 109).

McQuail (2006, pp. 107-118)reviewed nine books that, together, examined changes in warfare that have occurred since World War II: 1) an ideological rather than a national basis, 2) many small wars instead of one big one, 3) blurring of the line between war and terrorism, and 4) avoidance of large-scale total wars due to atomic weapons. Corresponding changes have been seen in the media that cover war: 1) media institutions more powerful and

separate from the state, 2) presumption of media access, 3) internationalization of media organization and distribution, 4) assumption that war requires effective public communication strategy, 5) recognition that war requires more public support than in the past, and that the media are crucial to this support. The media's presumed role in starting and stopping conflicts depends on the belief that the media has strong effects on public opinion, but this has not been proven (McQuail, 2006, pp. 115-116). The link between public knowledge (not opinion) and informational patterns of news has been substantiated much more than the opinion link. McQuail (2006, p. 116) explores the inadequacies of the media when reporting on a war: reportage is very selective, oversimplified, little explanation is given, it is biased for one side, frames are restricted, emphasis is put on spectacle and less emphasis is put on death and destruction for the other side. Truly objective and independent reporting of war is rare if not impossible, since there are so many restrictions involved. War means chaos and danger, reporters are dependent on military personnel for access and information, and the editors and audiences back home still have demands for higher ratings and entertainment.

Dobernig et al. (2010, pp. 88-105) investigated the power of images in news reports about war and other conflicts. Because visual communication is much more efficient than verbal communication, the use of visuals cannot be ignored. It is a strong tool for framing and agenda-setting since it more readily evokes an emotional response, drawing the audience into the story. Increased concern for a story increases its memorability. Most viewers don't realize that visuals are carefully selected and framed just as verbal text is, so it is easier to manipulate with a picture or video. The criteria for quality visuals is not the same as the criteria for quality verbals; visuals can serve dramaturgic (creating excitement and interest), illustrative (supporting verbal text), and journalistic (providing independent information) purposes.

Dobernig et al. (2010, p. 94) examined coverage of the 2009 Gaza crisis by four quality news magazines sold in Europe and analyzed the articles to determine the number and type of visuals that were associated with them. They found that two of the news magazines always had images with their articles, while one had visuals in less than half of their articles. Interestingly, they found that the verbal texts had more information on Israel and Israeli actors, while images were more Palestinian. Also, the latter tended to be pictures of civilians,

which typically evoke empathy. Thus, the authors found that verbal and visual did not always match. They concluded that future research should study the correspondence of image content with verbal content, then determine if and how the disparity could affect public opinion (Dobernig, et al., 2010, p. 103).

Baker (2012, pp. 40-49) examines the impact of social media on the English riots of 2011. First, she makes use of 19th and 20th century "crowd" or "mob" theories to determine their applicability to the current situation, and finds that they are not able to account for the use of social media. Although the press has generally considered the riots to be explained by criminality and austerity, Baker suggests that these reasons overlook individuals and the emotional aspects of their collective action. She introduces a new concept, the "mediated crowd," and argues that emotions research together with empirical analyses of riot conditions can illuminate the link between new social media and the riots. Unlike the old "crowd" theories, which focused on emotional contagion within a physical space, the concept of the "mediated crowd" establishes an area of cyberspace, which could be called a virtual public sphere, through which individuals can communicate opinions, thoughts, and plans, and thereby organize demonstrations such as the 2011 riots (Baker, 2012, p. 48).

Barak (2010) looks at the relationship between mass media and crime using a social constructionist perspective. He postulates three main media spheres – entertainment, news, and online – with many sub-spheres, including books, films, radio, TV, and Internet. By further subdivision according to discourse style or crime construction, he examines characteristics of media crime coverage. For example, the media generally gives more attention to felony acts of violence than to white-collar fraud. What is the reason for this disparity? Barak points out that research in this area requires considerable expansion, especially with regard to the Internet. He asks, "How is crime socially constructed through new forms of communication? How successful is mass mediation of conforming behavior?" As an example, he points to "pro-abuse cyberspace male peer support groups associated with certain types of shared pornography." So far this type of crime has not been studied by media researchers (Barak, 2010).

As mentioned above, Barak uses a social constructionist perspective for the study of relationships between media and crime. He points out that over the past forty years a

scattered body of mediated knowledge has appeared in a variety of disciplines, including "sociology, education, political science, psychology, media and cultural studies, and… criminology." (Barak, 2010) With regard to framing in the social construction of crime, he points to the concept of "moral panic," a situation in which public fears and government responses are greatly exaggerated when compared to the actual danger, if any (a good example of a "moral panic" is the fear and massive investigation of Satanic ritual abuse in the 1980s – the fear still exists in some quarters in spite of the fact that there has never been any concrete evidence that this type of abuse ever existed).

Barak (2007) points out that scientists have been studying criminology for well over a century while media studies are relatively new. The relationship between the media and criminology shows the greatest dearth of research. Mediated crime and criminal justice are associated with cultural views of crime; that is, the media calls up cultural images of crime and criminals in the minds of the audience, and these images then influence the media, such that news stories for mass media reveal much about the society's belief systems. Although journalists may attempt to be objective in their reporting, it is impossible to attain 100% objectivity (Barak, 2007).

Hjarvard (2006) presented a theory of the mediatization of religion, which he begins by discussing the supernatural in television, movies, and other media. He points out that many national presses have increased their religious coverage over the last decade, and that religions themselves have acquired ever greater territory in the media, including radio, television, and the Internet. Hjarvard notes that some sociologists emphasizing secularization and re-sacralization may miss the point of media-religion interactions. Borrowing from Joshua Meyrowitz, he presents three metaphors: media as channel, media as language, and media as environment. Each has its own way of affecting religion.

Media as channel focuses on the content of the media – religious texts, hymn books, etc., and religious services on television. Most religious programming, however, does not originate with religions but with the media itself, and as such, the media become "distributors of…banal religion." Media as a language emphasizes the formatting and framing of the message as it is found in the sender, content, and receiver. The choice of medium and genre has a significant impact on the kind of message, formats, and frames that

can be used. Media as environment concentrates on the structure provided by media for human interactions. The Internet has changed this aspect of media from the one-directional pattern of radio and television to the current multidirectional path. The Internet has even stimulated the older media to adopt multidirectional pathways for their own use (e.g., texting opinions to a newscaster).

Hjarvard (2006, pp. 8-10) examines the media's spiritual functions using a 2005 representative sample of the Danish adult population. The first question asked how the respondent deals with spiritual questions, and discussion with family and friends was the preferred method, followed by TV programs. In the next question, participants were asked which media were used for moral orientation (good and evil). Narrative and fiction media were favored. Subjects were then asked if four popular media products had increased their interest in "magic and adventure," "spiritual questions," and/or "religious issues." The four products were the *Harry Potter* stories, Dan Brown's novels, the *Lord of the Rings* trilogy, and the computer game *World of Warcraft*. Each product had a slightly different effect depending on its primary themes. For instance, Dan Brown's novels encouraged interest in spiritual and religious issues more than any of the other three.

Hjarvard (2006, p. 11) also points out an unusual occurrence when there is a tragedy or an exceptionally interesting religious ceremony, such as a royal wedding. At that time, the media cover the events as unobtrusively as possible, striving to be merely channels of transmission for the religious institution performing the funeral or wedding ceremony.

Even scientific research has been mediatized (Weingart uses the term "medialized"), according to Weingart (2012, pp. 17-32), who states that media – even fictionalized media such as films -- can serve to introduce scientific concepts to the public, provide an arena for public discussion of scientific issues, and legitimize the practice of science. As the media becomes more important in changing public opinion, scientific research (like politics, religion, and other aspects of culture) will be required to adapt itself to be more media-oriented.

Cottle addresses the theoretical views of mediatized rituals, which he defines as "those exceptional and performative media phenomena that serve to sustain and/or mobilize collective sentiments and solidarities on the basis of symbolization and a subjunctive

orientation to what should or ought to be" (Cottle, 2006). He states that mediated rituals can allow for societal reflection and self-critique, and can even be politically disruptive in some societies. This opinion is contrary to those of earlier theorists about rituals.

Auslander examines mediatization in the context of performance, both live (concerts given in the physical presence of an audience) and mediatized (mediated by a technology such as TV, film, radio, or recordings). The technological backdrop of culture and media is characteristic of Western society, so much so that some theatres display banners saying "Not Available on Video."

Similar to branding is the idea of a virtual leader construct or VLC. The mediatization of consumption – particularly fast food consumption – was studied by Boje and Rhodes (2005, pp. 407-428). The authors found three levels of VLCs: imitation of a former leader (Dave Thomas, Wendy's), creative representation of a former leader (Colonel Sanders, KFC), and a fabricated leader with no direct relation to an actual person (Ronald McDonald, McDonald's). VLCs fulfill functions of mediatization, such as extending limits of communication, substituting for social activities, inserting communication into ordinary life, and producing large output at low cost. Along with mediatization, resemiotization occurs as a message is moved from one medium to another, and double narration both enhances the leadership story and adds new meaning. Boje and Rhodes (2005) found that the greatest amount of new meaning is achieved with the greatest virtualization; Ronald McDonald can even "talk back" to his corporation!

Hattam et al. (2009, pp. 159-172) reported on the mediatization of educational policy using an Australian case study. Appropriate "spin" for education policies was determined by an Australian Federal Minister of Education and a media expert, creating a public "package" to make policy more attractive to the audience. The authors suggest that the mediatization of policy in this manner functioned as a kind of propaganda to prevent creative education initiatives which arose in response to social-democratic reforms that followed World War II. In this media arena that is specific to educational policy, the authors consider backlash politics to be justified, and they present logic to support critically self-reflective educational environments. The media's choice in working with the government is viewed as an abandonment of democratic principles (Hattam, et al., 2009, pp. 170-171).

Schulz (2004, pp. 87-101) described the role of media in changing society on a larger scale. She found that four main processes occurred which allowed the media to change communication and interaction between individuals and groups. First, media allow interaction in extended time and space; second, media provide substitutes for face-to-face interaction (e.g., Internet banking); third, combinations of face-to-face and mediated communication are created (e.g., video chats); fourth, public figures in an array of institutions must adapt to media (Schulz, 2004, pp. 88-93).

Postmodern theories of mediatization have described media in the fine arts and in creating a "hyperreality" – a mental construct, or simulacrum – that becomes more real to human beings exposed to it than are the physical and social worlds (Baudrillard, 1994). According to Hjarvard, Baudrillard does not doubt physical and social reality, but merely emphasizes the effects of media to a greater extent than some scientists (Stig Hjarvard, 2008, p. 111). Sheila Brown (2003) outlines a similar postmodern view in which the lines between such opposites as fact and fiction, science and art, and global and local are quickly disintegrating. The latter distinction, local vs. global, may be the first one to disappear; as suggested above, media allow distribution of culture over a wide area and begin to blur the difference between smaller areas. Of course, this process is far from complete. There are areas of the earth that have not yet been touched by the media, but that condition may not last much longer (Brown, 2003; Stig Hjarvard, 2008).

The theory of mediatization espoused by Hjarvard uses Schulz's four processes, but in addition applies a sociological perspective and a historical situation. The concept thus describes a setting in the development of society and culture in which media strongly influences other social institutions. However, he considers "the postmodernist understanding of mediatization at once too simple and too grand." (Stig Hjarvard, 2008, p. 111). Although there has been some erosion of fact vs. fiction (and other categories), it is clear that individuals can still distinguish between these two in most cases. Hjarvard (2008, p. 112) does not believe that society could still function if the lines were truly gone; Baudrillard's (1994) hyperreality appears exaggerated and scientifically unverified.

Cottle and Rai (2006, pp. 163-189) outline communicative frames and suggest a universal television news architecture after examining 9,662 news items in national and satellite

broadcasts covering six countries. They use both analytic and expressive dimensions to determine the engagement and appeal to the audience, and relate this to conflictual and consensual reactions. In establishing a TV news architecture, they begin by studying TV news in the light of several theoretical approaches. First, social theory involves the "democratizing of democracy" to produce radical pluralism and a variety of interests and identities (Cottle & Rai, 2006, p. 166). The media works in this process to give access to more people. Political theory also suggests that TV journalism is crucial to deliberative democracy because it deepens public engagement in the political process. "It is in the mediatized play of difference…that we, the watching and listening audience often find invaluable resources for improved understanding." (Cottle & Rai, 2006, p. 166) Deliberative democracy needs a strong concept of the "public sphere" in order to function, which is significantly affected by media performance and potential. Journalism theory also discusses the purpose of the public sphere and public journalism in the democratizing potential of the media. The dualities of journalism in the "postmodern" world, such as public knowledge/popular culture, objectivist/subjectivist, narrative/exposition, and dialogue/dissemination, interpenetrate the complex forms seen today, helping to define them and their communicative force. According to Cottle & Rai (2006, p. 168), "less dichotomized thinking is clearly called for."

Cottle & Rai (2006, pp. 170-179) used the above theoretical views to construct communicative frames and to test them empirically in the public sphere (this is a different use of the word "frames" from the one used by most media/communications researchers). Conflict communicative frames, which are more deliberative, include *dominant*, *contest*, *contention*, *campaigning*, and *expose/investigative*. Consensual frames, which are less analytical and more cultural, include *community service*, *collective interests*, *cultural recognition*, and *mythic tales*. Two other frames use both kinds of communication: *reporting* and *reportage*. These two are distinguished by depth of content: reporting gives a factual story and that is all, while reportage tries to stimulate deeper understanding of the story and insights into what is behind it (Cottle & Rai, 2006, p. 179). In a published research note, Barak (2007) suggests that Cottle's communicative frames might provide a useful structure for the examination of social constructionist theories of crime and justice.

Hepp (2008) discusses mediatization and cultural change from two positions: 1) mediatization as an explication of "media logic," and 2) a critique of a linear view of the

process. Hepp agrees with Couldry in that media processes are dynamic and nonlinear, and thus the transforming power of media should be studied with regard to a particular field (Hepp, 2008, pp. 142-143). He sets forth the quantitative dimensions of mediatization as social (addressing a mass audience), spatial (covers regional and national territory), and temporal (speeds up communication to potential real-time). Culture change has its own dimension of individualization, deterritorialization, and intermediacy, which together lead to pluralities of deterritorialized communicative spaces – i.e., similar to public spheres set up in cyberspace. Hepp goes on to illustrate his theoretical perspective using Catholic World Youth Day as an example (Hepp, 2008, pp. 150-152).

Mazzoleni and Schulz looked specifically at the impact mediatization has on democracy. Their study reviews the influence media has on the U.S.A. and other democratic countries. In their publication "Mediatisation of Politics: A Challenge for Democracy?" (1999), they conclude that all the evidence they reviewed does not show any significant proof that democracy is already, or will be in the future, solely media-driven. Even though politics will always be a huge part of media coverage, politics will not be governed by it. As Mazzoleni and Schulz state at the end, “In brief, ‘*media* politics’ does not mean ‘politics *by the media*’” (Mazzoleni & Schulz, 1999).

Strömbäck and Dimitrova also studied mediatization closely. However, they compare two specific countries: Sweden and the U.S.A. In their 2011 study "Mediatisation and Media Interventionism: A Comparative Analysis of Sweden and the United States,” they talk about so-called indicators. Those indicators (six in total) are measures of the degree of media influence on politics (Strömbäck & Dimitrova, 2011).

One example of Strömbäck and Dimitrova’s mentions the style of the written article and how a political event may be covered. Is the style descriptive or is it interpretive? The interpretive style is influential, whereas the descriptive style is merely passive, non-biased, non-emotional, completely neutral and objective. The findings are that America has a more intensive media coverage of politics than Sweden. But they do not provide any detailed conclusion as to the degree of influence. In fact, Strömbäck and Dimitrova state that more in-depth research is needed in the future (Strömbäck & Dimitrova, 2011).

Strömback conducted a study on his own in 2008. He provides an analysis of media influence in politics, this time focusing more on what he calls "traditional news media" (pg. 244). He concludes that media has changed and that its influence on the public has intensified. Yet he also believes that the extent to which the public is influenced by mediatization depends on the belief of each individual, how well that person is informed, etc. (Stromback, 2008).

Schulz et al. looked at Germany and the influence of media coverage over the years (Schulz, 2004). Schulz and his colleagues find an increasing use of media coverage and the various styles of politicians over the years. Some German politicians even used the “American way” and its negative style, or as they call it a “campaign following the American pattern” (pg. 28).

Winfried Schulz published his study “Reconstruction Mediatisation as an Analytical Concept” in 2004. He studies the evolution of mass media, from the very limited media coverage of TV and radio to modern mass coverage on such media as the Internet. His study shows the constant broadening of media possibilities and the influence on the public. Schulz – in contrast to other scientists – predicts a further continuous evolution rather than a limitation of media possibilities (Schulz, 2004).

Nick Couldry and his 2008 study take a different approach to the term “mediatization.” He views it from the standpoint of “digital storytelling” (Couldry, 2008, p. 390). Scientist Piet Verhoeven, like Schulz et al., offers a retrospective review with his 2008 study of the Dutch television coverage of medicine. Verhoeven concludes that the mediatization of medicine has not only evolved but also grown over the years. He suggests, however, that further research is needed to study the effect this has on the public.

What this does is expand our understanding of mediality. We can see it as a reciprocal blend of culture, technology, and society that the press, TV, and World Wide Web use daily to develop and communicate words and ideas. It is this comprehensive media process that really matters, not an individual example of communication. From this process comes mediality.

The evolution of the total media system of modern media-culture societies, from writing to the Internet, has fundamentally changed our relation to the world and our modes of

communication. This change can be described as [the] transition from communicativity to mediality (Schmidt 2008, p. 95).

If we accept this definition of mediality, it bears a resemblance to what North Americans refer to as media ecology. This in turn refers to the idea of mediality as the water in which fish swim. The point of this metaphor is that the best way to study mediality is to treat it as an environment.

Mediatization, however, is not only an evolutionary process. Instead, it also can refer to contemporary processes. In general terms, these processes describe the ways in which all types of media ubiquitously consolidate the socio-cultural world of life.

Krotz (2008) expresses this idea in similar terms when he says that mediatization is an example of a meta-process. According to Krotz, *"*meta-processes are all embracing *constructs which describe and explain theoretically specific economic, social, and cultural dimensions and levels of actual change" (Krotz, 2008, p. 257).*

Other meta-processes are commercialization, individualization and globalization, all of which are able to transform society. But Krotz says that the most critical meta-process "is that of mediatisation. By this we mean the historical developments that took and take place as a change of (communication) media and its consequences, not only with the rise of new forms of media but also with changes in the meaning of media in general" (Krotz, 2008, p. ???)

Although they have been manifest in the past, processes like mediatization (or globalization, commercialization, etc.) are prominent in the present as elements of relentless change.

Medialization is a derivative designation for this transformative meta-process. The preferred designation for this development translates in German most directly as "medialization." Hence the occasional appearance of this term in English as well.

But mediatization is not only a process; it also a state. Many researchers say that mediatization is such a long-term process that it cannot be observed in a "short" empirical study. They maintain that if we observe developments over the last ten years, we cannot comment about mediatization because the process is not observable over such a period.

This is only partly true. I agree that mediatization is a long-term process, but every process is also a state, and a process can always be observed as a state.

Let me clarify this with an example. When a car is moving from London to Paris, we can observe its progress for 100 kilometers. This distance is not enough to say much about the entire journey, but we can still make reasonable observations about speed, direction, driving habits, the condition of the car, and so on.

A further example is when you want to find out how decorative your living room is. You have two options. The first is to compare several rooms with yours and describe the differences. You can use the comparisons to say what is different about each room and what is better. The second option is to observe just one room and describe its state independently of the other rooms.

We can therefore say how influential media can be without seeing the process of increasing or decreasing influence. When I read that some media frames persuade 80 percent of readers, I conclude that the readers are under a relatively strong media influence. I don't need to compare this to the percentage of readers that were influenced by the same media frame ten years ago.

Similarly, the increasing influence of media over markets can be explained by the mediatization phenomenon. Mediatization theory in mass communication science is quite new and still developing. In the past few years, however, significant research has been done that contributes to the understanding of the theory.

Imhof sees in mediatization a paradigm shift (Imhof, 2009). Krotz describes mediatization as the process by which modernity is shaped. This definition is based on the assumption that only the media, and not other elites, have the power to shape the future of society (Krotz, 2008).

Like Krotz, Hjarvard suggests that in modern times the media, through the process of mediatization, is gaining sufficient power to prevail over influential institutions (S Hjarvard, 2008). Mazzoleni & Schulz share this point of view when they say that mediatization is the process by which institutions and whole societies are shaped (Mazzolini & Schulz 1999).

Lilleker also believes that mediatization is the process by which media shape and frame the processes and discourse of communication (Lilleker, 2008).

It is highly probable that this present thesis is one of the first reports to describe the mediatization of economics and markets. General mediatization research is quite limited in scope at the moment, but far less research has been done on the mediatization process in economics.

I will attempt to fill the gap with this thesis. I will focus attention on the mediatization process that takes place in different market enviroments.

To do this successfully, I must make mediatization measurable. I am aware of the challenge I face. Mediatization is an abstract and philosophical concept, and it is difficult to make something abstract and philosophical measurable. However, this thesis will try to make mediatization empirically accessible.

I beieve I can achieve this because mediatization essentially refers to the increasing influence of media. In other words, media decide what we should think about (agenda-setting) and how we should think about it (framing). Media are defining society and not the other way round. By using this definition, I make mediatization empirically comprehensible.

As already stated in above chapters, mediatization can be best observed in the long or even very long term perspective. Many classical studies mentioned in the literature review of this thesis attempt to study the perspective by doing that. They look at long term political or social processes and try to see macro structural changes in the ways the society interacts and communicates. Such a method, however, while very legitimate, has many drawbacks. The biggest drawback of long term studies is the lack and non-availability of reliable empirical data. Only with digitalization has our society entered the period when data best usable for sound empirical research is available. Even this phenomenon itself – I mean the availability of or non-availability of datasets – is an indication of increasing mediatization. However, for reasonable scientific research, we need more proof than indications, and to see such proof of some long term processes in short term datasets is very challenging. Sometimes this issue poses an insurmountable obstacle. Yet, in this particular case, as I already have argued, there is a way to see proof or disproof of mediatization also in the

short term datasets. But here we have to bear in mind that we are not looking at the process. We study rather a state in which modern societies live; hence, the question is no longer whether the mediatization process and structural changes can be observed but whether the mediatization state is that in which we live at the given moment and whether the social structures are already formed. It is indisputable that in order to see in what state we live, we do not necessary need to know in what state we were living in the past. Also, in order to see what structures our society has, it is not necessary to see what structural forms society had one hundred years ago. To make this point once again clearly, I would like to repeat that the given thesis is concerned with observing the state and the short term processes within this state of being which, do not necessarily say something about the long term social occurrences, but which still say a lot.

The logical question which will emerge after the above argumentation is: for what aspects should we look in order to describe and understand the state of mediatization? This question has already been partially answered above but repetition here may be of some benefit for clarity and flow.

As already stated, the mediatization state can be observed by measuring the agenda-setting power of the media. By measuring the impact of frames, we can see the power media exercises over society. Furthermore, at this point I would like to argue that mediatization leads to the creation of new class structures in the society. In the 20th century, education and information (as a more educated person is a person who is more informed about some subject), was a necessary means for a person to belong to the upper social class. The higher the education, the higher the opportunities for people, and hence the higher the chance of moving up in the social hierarchy. In the mediatization state, as I understand it, this logic is no longer fully applicable. Having knowledge is no longer enough in a society where information comes from every corner of the world each fraction of a second. Now, selecting and the rapid processing of relevant information defines the new classes. The better one's information selection tools, and the faster one's act of news processing, the higher the chances of climbing up and staying on the top of the social hierarchy in this mediatized and globalized world. In our age, where information is available to everybody by every means of communication, the winners are those who get information faster. Hence, the question is

not whether we will get information, but how fast we will get information. The fastest is the winner.

Accordingly, in this study we will look on the impact of news frames not only in space but also in time and observe whether mediatization does indeed cause the emergence of a new two-class information society.

2.4 Framing

The beginning of the research on framing lies in prospect theory, and I would like to begin my overview there.

Prospect theory, formulated by Kahneman and Tversky in 1979, has become an increasingly popular alternative to the theory of expected utility as related to decision making involving risk. Prospect theory proposes that outcomes are not weighed as net asset levels, but rather as net losses or gains respective to a designated reference point. An individual's assignment of this reference point is a critical value, since a loss is seen as more significant than a comparable gain, and behavior will tend to be risk averse if expecting gains but risk acceptant with the possibility of loss. Wide ranging, rigorous experimental situations have provided initial confirmation of the proposed pattern of loss aversion and the importance of framing, and have become well known in behavioral decision theory literature (J. C. S. Hershey, P. J. H., 1980a).

Robert Jervis (1988, 1989; 1991) and other noted international relations scholars have begun to incorporate framing, loss aversion, and varying risk propensity evaluations in the field of foreign policy decision making. Previously used primarily in an adjunct role modifying other theoretical constructs in most applications of the theory (Huth, 1992; Jervis, 1988, pp. 96-698, 1989, pp. 94-95, 168-172; Lebow, 1987, p. 54; J. S Levy, 1987, pp. 101-103; J. S. Levy, 1989a, p. 274, 1989b, pp. 126-127; Maoz, 1990), key elements of prospect theory have been applied independently in international relations theorizing (Stein, 1992). These key elements of prospect theory also have served as the essential organizing framework to structure case studies of foreign policy decision making (Farnham, 1992; McDermott, 1992; Mclnerney, 1992).

Viewpoints regarding social psychology, economics, and decision theory literature concerning the empirical validity of prospect theory, and experimental laboratory tests (Hershey, & Shoemaker, 1980b; Machina, 1982; Slovic, 1983) will not be discussed here. Nor will I address the broader issues of whether or not documented violations of expected utility are considered "irrational" behavior and invalidate the theory, whether prospect theory surpasses expected utility theory, or whether normative and descriptive theories of decision making can ultimately be reconciled.

Expected utility theorizes how decisions are made under conditions of risk. Each of the various alternatives results in one of a set of possible outcomes, and the probability of each outcome is known. (The concept of risk differs from both certainty and uncertainty. Certainty means that the probabilities of the outcomes of different choices are known and have a value of zero or one; uncertainty means that the probabilities of outcomes are not completely known.) The principle of expected utility stipulates that, given the choice between risky options, individuals strive toward maximizing the expected utility. In other words, they rate the utilities of each of the possible outcomes by their probabilities, and select the option with the highest weighted sum (Luce, 1957). Since Bernoulli's 1738 proposal of the expected utility principle, where people value random ventures according to their expected return, the assumption maintains that the psychological value of money and most other durable goods does not increase in proportion with the objective amount, but rather that there is a diminishing marginal utility for money. The representation of this is a concave (downward curving) utility function, while an increasing marginal utility is represented by a convex utility function, and a constant marginal utility by a linear utility function.

An individual's position relative to risk is typically identified in terms of marginal utility or the shape of the utility function. A concave, linear or convex utility indicates risk-aversion, risk neutrality, and risk acceptance, respectively. For example, if an individual is offered two options, one of which leads to a certain outcome of utility x and the other involves uncertainty, although the outcome would be the same utility x, a risk averse individual would choose the certain outcome instead of the gamble; a risk acceptant individual will be most likely to take a chance; and a risk neutral individual would not be particularly influenced either way. Concerning monetary outcomes, the majority of individuals tend to

be risk averse, preferring a certain gain of $50.00 or even less, over an equal chance resulting in either $100.00 or nothing at all.

The analysis of decision making involving risk has been performed predominantly according to expected utility theory since it supplies a normative model of rational choice as well as a descriptive model demonstrating how people actually behave. It has been found, however, that not all hypothesized results match actual observed behavior.

Kahneman and Tversky (1979) were then led by these anomalies occurring with expected utility theory to propose prospect theory as an alternative analytical tool regarding decision making under risk.

To begin with, Kahneman and Tversky present the results of several laboratory experiments involving hypothetical choices, some of which are summarized here due to their importance.

(1) Potential gains and losses rather than their actual net assets drive people's thinking, and they therefore encode subsequent choices relative to deviations from a selected reference point. Kahneman and Tversky (1979, p. 273) posit that "the carriers of value or utility are changes in wealth, rather than final asset positions that include current wealth." While accepting that asset position does matter in principle, they propose that "the preference order of prospects is not greatly altered by small or even moderate variations in asset position" (p. 279). They identify the reference point, for the most part, as the status quo, but that is not always the case. They note deviations from a target value or some other reference point not associated with or based on the status quo. This variation is naturally followed by questions regarding the framing of a choice problem, the discussion of which appears later.

(2) Gains and losses are viewed differently in two important respects. People are usually risk averse when faced with gains, but risk acceptant when there is the likelihood of losses. Representative experimental findings (Kahmenman, 1979) show that 80% of participants chose a certain outcome of $3,000.00 to an 80% chance of $4,000.00 and 20% chance of nothing. Conversely, if choosing between the same two prospects in a negative construct, 92% chose to gamble on the 80% chance of losing $4,000.00 and 20% of no loss to a certain loss of $3,000.00. In each of these cases, the option with the lower overall value was

selected, and the observation of the combination of the two patterns is inconsistent with expected utility theory. The degree to which people are risk averse or risk acceptant, or the amount they are prepared to sacrifice in expected value in order to avoid a certain loss or secure a certain gain, was not quantitatively determined, but laboratory experiments commonly reported figures in the range of 20%-30%.

The results of these experiments indicate that individual utility functions are concave in relation to gains and convex relative to losses. Kahneman and Tversky (1979, p. 268) refer to this pattern as a reflection effect around the reference point. One explanation for this seems to be that the effect of the degree of changes in assets decreases the further away from the reference point things move, and, in fact, in either direction. This would not be the case of a true utility function that was definitely either concave or convex. This phenomenon has been observed repeatedly, even when using a variety of participants as well as different situations (Fishburn, 1979), but it may correlate less when considering very small probabilities or for devastating losses. This will be addressed further at a later point in the monograph.

(3) The second manner in which gains are treated differently than losses is that "losses loom larger than gains." "I hate to lose more than I like to win" is a statement by Jimmy Conners that serves as an example of this approach. This aspect of loss aversion is understood as people preferring the status quo (or another reference point) to an equal chance for either positive or negative results with the same absolute value. Another implication is that people value what they have over "comparable" things they do not have. The effort of achieving a goal increases its inherent value, even if the results are as insignificant as candy bars or coffee mugs. Thaler (1980, pp. 43-47) has coined the term "endowment effect" for this over-evaluation of current possessions. Combining loss aversion with the endowment effect leads to the idea that selling prices should exceed buying prices: the remuneration for giving up an item is considerably higher than the price people would be willing to pay to obtain something of a relative equal value. Experimental literature contains repeated demonstrations of the endowment effect and evaluation disparities (Kahneman, Knetsch, & Thaler, 1990; Knetsch, 1989; Knetsch, & Sinden, J. A., 1984). They account in large part for the inclination of people to weigh out-of-pocket costs (losses) more heavily than opportunity costs (foregone gains), and evidence indicates that they also affect an individual's judgment

regarding fairness and justice (Kahneman, Knetsch, et al., 1991, pp. 203-204). Legal doctrine also reflects the endowment effect and discrepancies of evaluation by recognizing an unequal comparison of the acts of commission and omission, as well as "loss by way of expenditure and failure to make a gain." Compensation tends to be paid more readily for actual loss than for the denied opportunity to seek profit (Kahneman, Knetsch, et al., 1991; Kahneman, Knetsch, & Thaler, 1990).

Important implications for utility theory arise out of the endowment effect. The effect questions the validity of the assumptions that (1) people do not change their preferences, even when different examples of equivalent choice problems exist (because framing affects preferences), (2) indifference curves can be reversed and do not intersect, and (3) preferences are not dependent on endowments (an individual's choice between A and B may hinge on A currently being a part of the endowment) (Kahneman, Knetsch, & Thaler, 1990; Knetsch, 1989; Slovic, 1983; Tversky, Slovic, & Kahneman, 1990).

Even if an endowment is unexpected or is a large amount, the endowment effect still exerts its influence. Due to the situation being somewhat artificial, however, the extent of the effect may be slightly reduced. In this case, laboratory trials might be expected to underestimate the actual degree of endowment effects (Knetsch, 1989, p. 1282). In addition, cognitive dissonance theory indicates that the length of possession of a good, and, more importantly, the degree of effort and expense to achieve it, the higher the perceived value of it will be (Jervis, 1989). In reference to international relations, the endowment effect should be all the more influential due to the symbolic value of political and economic assets.

Regarding normal commercial transactions, however, the endowment effect and loss aversion do not seem to have much, if any, influence. The cost of an item is not considered to be a loss, and the endowment effect does not apply to goods meant for sale or barter to much of a degree (Kahneman, Knetsch, & Thaler, 1990, p. 200). Experimental evidence hints that the physical possession of a good promotes a stronger and more consistent endowment effect than the property right to a good that may or may not be received some time in the future (Kahneman, Knetsch, & Thaler, 1990, p. 1342).

(4) The identification of the reference point, or the framing of a choice problem, becomes critical due to the encoding of outcomes relative to a reference point and the unequal treatment of gains and losses. A particularly significant example of the influence of the framing effect is found in the following medical example (Tversky, & Kahneman, 1981, p. 453). Test subjects were presented with two hypothetical programs intended to combat the outbreak of a disease that would potentially kill 600 people. Two groups of test subjects were given identical information, namely, statistics presented as a consensus of scientific opinion detailing the expected effect of the epidemic and the two proposed treatment plans. One group, however, was given the information relative to the number of people who would be saved (the "survival frame"), and the other group received the scenario relative to the number of people who would die (the "mortality frame"). One set of statistics (A) showed that 200 people would survive (or 400 would die), and the other set provided a one-third chance that all 600 people would survive (and none would die) and a two-thirds probability that none would survive (all 600 would die). Results then indicated that a definite majority (72%) in the "survival frame" chose the cautious option, (A), but a similar majority (78%) in the "mortality frame" chose the risky alternative, (B). This demonstrates that whether the issue is framed in terms of gains or losses, there is a demonstrable impact on preferences, notwithstanding the relative mathematical equality of the two choice scenarios. The "survival frame" promotes a downward shift in the reference point, which is, in effect, the same as adding a positive constant to all outcomes. Outcomes are influenced by this downward translation effect (Abelson, 1985, p. 248) by raising the incidence of risk aversion.

The significance of framing has been borne out by numerous other experimental studies (Fleishman, 1988; Levin, 1985; McNeil, 1982; Tversky, & Kahneman, 1986). In order to frame a transaction as a gain rather than a loss for the consumer, gas stations and other businesses offer a cash discount as opposed to requiring a credit card surcharge, recognizing the importance of framing effects.

The parameters, or framing, of the test scenario are predominantly determined by the situation (or the experimental design) in the majority of basic choice problems, but other cases require more subjectivity and sensitivity to the way an individual responds to the variables and encodes a decision. This is observed primarily when the process requires a

sequence of choices and where the status quo is not clearly discernible. The question is whether the reference point for each option is framed cumulatively relative to the asset position at the outset of each set of choices, or if it varies depending of the asset position as it changes relative to each individual step. The decision making options of gamblers provide a case in point. If a gambler has suffered a series of losses, the inclination will be toward risk acceptance if he or she has accepted the cumulative frame of asset position at the beginning of the game and attempts to win back those assets. On the other hand, a gambler who bases strategy on current asset levels would tend to be risk averse. The opposite applies for a gambler on a winning streak. That person will tend to be risk averse if the choice is framed from the standpoint of initial assets as opposed to the assets accompanying each new bet.

This example provides evidence of the importance of how individuals adjust to gains and losses. Accommodation to losses tends to result in risk aversion (relative to non-accommodation) but accommodation to gains leads to greater risk acceptance with the intention of maintaining those gains (Abelson, 1985, p. 249). The question then arises of the speed with which individuals or states adjust or renormalize (Jervis, 1992) to a new status quo, as well as the effect of different conditions and types of situations. An instant endowment effect (Kahneman, Knetsch, & Thaler, 1990, p. 1342)) is commonly accepted with the result that participants accommodate to gains more readily than to losses. Strategic interaction in dynamic situations is, therefore, dramatically impacted. Given the hypothetical situation in which (A) has gained at the expense of (B), and (B's) efforts to recoup those losses (relative to the old status quo) are seen as a loss by (A), given their new status quo, both sides will be more risk accepting since they both feel they are in a position of overall loss. Applications of this paradigm in relation to bargaining efforts in international relations will be examined later.

(5) The certainty effect (Allais, 1953; Kahneman, & Tversky, 1979) has also been identified in various studies. This involves individuals who over-value outcomes that are certain compared to outcomes that are only probable as well as over-valuing small probabilities and under-valuing moderate or high probabilities. The latter effect occurs more frequently than the former. Outcomes which are perceived to be quite likely, yet uncertain, are applied as certainties, and this phenomenon is called the pseudo-certainty effect by Kahneman and Tversky (1986, p. 268). Therefore, changes in probabilities in the range of zero or one have

more of an impact on preferences than the same degree of change in the middle of the probability range. This results in the ratio difference principle or sub-proportionality: the impact of any fixed positive difference between two amounts increases with their ratio (Quattrone, 1988, p. 728; Tversky, & Kahneman, 1986, p. 263).

The comparable evaluation of total elimination, in contrast to a reduced degree of risk, is demonstrated by the findings that people are willing to pay significantly more to reduce the risk of a drastic loss from .10 to 0 than from .20 to .10, in spite of either scenario having the same expected utility. More clearly, subjects in an experimental scenario of the game of Russian roulette are willing to pay significantly more to reduce the number of bullets in the hypothetical gun from one to zero than from four to three (Quattrone, 1988, p. 730). These reactions do not fall in line with the expectation rule (that the utilities of risky outcomes are weighted linearly by their probabilities) and the ratio scale properties of expected utility theory.

The availability heuristic (Tversky, & Kahneman, 1981), the perception that dramatic events that are easily remembered (images of disasters in the media, for example) are more likely to occur than they realistically do, may support the effect of over-valuing small probabilities. It must be noted, though, that in terms of analysis, the overestimation or exaggeration of probabilities, whether they are related to the availability heuristic or some other cognitive or motivational basis (Janis, 1977; Jervis, 1988) is not equivalent to the over-valuing of low probabilities. Overestimation is the subjective assessment of probabilities, potentially influenced by the dramatic recall of an event category or by other cognitive or motivational biases. Over-valuing, a property of the weighting function, is based on subjective probabilities assessments separate from the processes which generate them. This has been observed in laboratory experiments that provide the probabilities (Kahneman, & Tversky, 1979).

(6) Findings also suggest that individuals often do not consider components that are found in each of the alternative options, and that they do concentrate on elements that are different (Tversky, 1972) so that the choice between two alternatives may be simplified. This isolation effect, or cancellation, may result in different preferences, since there may be more than one way to break down choices into common and unshared elements, as

demonstrated by Kahneman and Tversky (1979, p. 271) in experiments involving two-stage choice scenarios.

These patterns of behavior regarding judgment and decision making contradict several of the basic premises of expected utility theory in non-transparent choice conditions (in contrast to more transparent choice situations where similarities between scenarios are more readily detected). Specifically, they contradict the premises of transitivity, dominance, invariance, and cancellation (or the independence of unimportant options). Various alternative models of risky choice have been proposed by various scholars in order to incorporate these unaccounted for patterns. Of these more recently devised models, prospect theory is acknowledged to be the most comprehensive and well known.

The goal of prospect theory is to include the identified contradictions to expected utility theory into a more encompassing theory of risky choice. Two phases in the choice process are identified. The first phase is the editing phase: (1) The editing phase is a preliminary analysis of the choice scenario, including the identification of the possibilities available to the individual, the potential outcomes or consequences of each, and the values and probabilities associated with each outcome. Also included in this phase are the organization and reformation of perceived options in order to "simplify subsequent evaluation and choice" (Kahmenman, 1979, p. 274; Tversky, and Kahneman, 1981, p. 453). The second is the valuation phase: (2) During the evaluation phase, the revised prospects are compared and the most advantageous prospect is chosen. Kahneman and Tversky have formulated a working model to explain the evaluation of prospects, but the theory of editing or framing is still being developed. Although editing has not received as much attention, it is as integral to prospect theory as the evaluation phase. Editing is the mental process by which the choice problem is simplified by reassessing the representation of outcomes and probabilities. Coding is the identification of a reference point and the framing of outcomes as variables (losses or gains) relative to that point with the possibility of affecting orientation toward risk. Simplification means rounding off probabilities or outcomes as well as eliminating the most improbable outcomes (setting their probability to zero), and this has the potential of distorting expected utility calculations. Detection of dominance involves looking for and removing dominated alternatives. A combination of probabilities associated with identical outcomes, and a segregation of a prospect component without risk from one

with risk are weighed in relation to the deviation from the determined minimum. Preference reversals and violations of invariance stem from the cancellation of elements inherent in each prospect or the elimination of irrelevant choices. Kahneman and Tversky (1979, pp. 284 - 285) discuss these editing functions in greater detail.

Editing, as an essential component of the choice process, is indispensable if prospect theory is expected to account for violations of invariance, preference reversal, intransitivities, and other irregularities of preference described above (Abelson, 1985, p. 250). Exactly how individuals edit choice problems in complex choice scenarios is not easily determined, given the fact that the process is affected not only by the "norms, habits, and expectancies of the decision maker," but also the elements that comprise a choice problem (Tversky & Kahneman, 1986, p. 257). Additionally, the result of the editing process may be determined by the sequence of editing operations. The difference of simplification that occurs either before or after combination and/or segregation may affect the final editing of choices and adds another factor of unpredictability in decision making.

As a result, Kahneman and Tversky have narrowed their focus to choice problems "where it is reasonable to assume either that the original formulation of the prospects leaves no room for further editing, or that the edited prospects can be specified without ambiguity." In other words, Kahneman and Tversky narrow their observation to the evaluation of prospects as opposed to the editing of choices, and the reactions they note are determined for the most part by the evaluation phase of decision making. It goes without saying, then, that editing is significantly more important in choice situations in international relations and needs to receive a great deal more theoretical and empirical attention.

Politics has proved to be an enduringly popular subject for framing. In his 2000 study, "Issue Framing and Public Opinion on Government Spending," Jacoby finds that the choice of words varies between political parties. In the U.S., for example, the Democratic Party focuses on a specific topic, whereas the Republican Party portrays a broad overall picture (Jacoby WG, 2000).

Jacoby states that people's opinions depend on the way a topic is presented. His findings show, for instance, that the way government spending was presented at times led to a change in opinion.

Lau and Schlesinger published their study “Policy Frames, Metaphorical Reasoning, and Support for Public Policies” in 2005. The phrase that stands out in this study is “cognitive frames.” This shows that politicians use the so-called “good versus bad” role to influence the public. For example, a new policy is presented in comparison to something negative. The words used are emotional and ideological, and they refer to values we all have. Another interesting finding of this research is that this type of framing influences people with limited political knowledge (Lau R & Schlesinger M, 2005).

In 2005, Barker stated in his research publication “Values, Frames, and Persuasion in Presidential Nomination Campaigns” the importance of values and the corresponding choice of words. He chose as an example the Republican nominations of 2000. He discovered that potential voters leaned towards nominees who used individualized terms. Broad speeches and promises did not have as much effect as references to individual concerns. However, Barker also found this type of framing had a greater effect on more educated people who had a better understanding of underlying cues in speeches. But either way, his study proved the theory of framing (David C. Barker, 2005).

Berelson and Lazarsfeld discovered in their earlier (1954) study “Voting: A Study of Opinion Formation in a Presidential Campaign” that voters’ opinions are based mainly on interpersonal views: the way a candidate presents himself; and the way a speech is worded (Berelson BR, Lazarsfeld PF, & McPhee WN, 1954).

Brewer took such political research to a broader level. He looked at framing as a political means to influence people, and as a means to influence the mass media. His 2001 study, “Value Words and Lizard Brains: Do Citizens Deliberate about Appeals to their Core Values?” studies the topic of elite framing. He considers questions such as: Do people really think about the message conveyed? Or are they so-called “automatic thinkers” who don’t criticize or give further thought to a message? Brewer is able to show that people think about what they hear, and they favor messages with words such as “tough love” as opposed to harsh descriptions. His conclusion is that elite framing takes a hit through people’s active thought processes (Brewer PR, 2001).

A year later (2002), Brewer and Sigelman showed that political framing influences media coverage, especially in regards to the presentation of political views as portrayed by

politicians themselves. In their publication, “Political Scientists as Color Commentators; Framing and Expert Commentary in Media Campaign Coverage,” they refer to the “frame game.” This game is pervasive in mass media. Brewer and Sigelman found that it results from bias in the selection of news and comments. It also originates from certain scientists and their prejudices (Brewer PR & Sigelman L, 2002).

In 2003, Brewer and his colleagues, Graf and Willnat, went on to consider the impact of framing on the views expressed about foreign countries. They looked at two forms of media coverage: indirect and direct. Indirect media coverage begins with a report about a domestic matter and then links this to foreign countries. Direct coverage examines an issue in a foreign country right from the beginning. The findings of their study “Priming or Framing: Media Influence on Attitudes toward Foreign Countries” were as follows: Direct news coverage forms people’s points of view and their opinions about other countries; indirect coverage does not (Brewer PR, Graf J, & Willnat L., 2003).

Brewer also studied the shaping of moral values through framing in his project “Values, Political Knowledge, and Public Opinion about Gay Rights: A Framing-Based Account,” published in 2003. His study shows that not only does political know-how increase over the years, but the level of knowledge also has an impact on moral traditionalism. However, the framing of political messages remains a prevalent issue. A lot depends on whether people hear or read competing messages, or messages from different parties with the same point of view (Brewer PR, 2003). Following this research, Brewer and Gross examined the impact of framing on values and political psychology. In their 2005 publication, “Values, Framing and Citizens’ Thoughts about Policy Issues: Effects on Content and Quantity,” they stated that framing can focus people’s thoughts on one subject or the other, one way or the other (Brewer PR & Gross K, 2005).

Chong conducted detailed research projects from 1993 to 2007 to study the impact of framing on political decision making, tolerance, and social norms. He examined how framing is able to shape people’s values and identities as well as their opinions of political and daily issues. His research includes: “How People Think, Reason and Feel About Rights and Liberties” (Chong D., 1993); “Rational Lives: Norms and Values in Politics and Society”(Chong D., 2000); “Free Speech and Multiculturalism In and Out of the Academy” (Chong D., 2006);

and “A Theory of Framing and Opinion Formation in Competitive Elite Environments” (Chong D. & Druckman JN, 2007).

Chong’s studies focus mainly on the difference in people’s perceptions of free speech issues among college students and the general public. One of his most important findings is that tolerance is largely shaped by topic presentation. Among college students, free speech - or “non-adapted” speech - has more impact than “conform” speech or “well-adapted” speech. Either way, it is clear that the readers’ or listeners’ level of education does not matter as long as the method of framing is applied and adjusted to the topic and target audience. Chong’s approach is a critical look at framing and priming, and their effects on media coverage and the public. Chong and Druckman take a further look at this topic in their 2007 research, “Framing Theory” (Chong & Druckman, 2007c). Chong also collaborated with Druckman to publish “A Theory of Framing and Opinion Formation in Competitive Elite Environments” (2007). In this, they describe how framing affects college students and gives rise to racial problems (Chong & Druckman, 2007a).

As well as working with Chong, Druckman produced other publications. These include: “Evaluating Framing Effects” (Druckman JN, 2001a), and “On the Limits of Framing Effects: Who Can Frame?” (Druckman JN, 2001b). In both of these articles, Druckman looks at the influence of framing on racial tolerance. Druckman’s conclusion is that the level of education (in other words, the amount of information the public receives) can reduce the influence of framing.

In another 2001 study, “The Implications of Framing Effects for Citizen Competence,” Druckman conducts more detailed research. He doesn’t only look at the affect of framing; he also examines when it occurs, how it occurs, and why it works (Druckman JN, 2001c). The question arising here is: Does his study confirm earlier work by Entmann (1993), who stated that people should aim to be more informed and “get all the facts” before making a decision and forming an opinion? According to Entmann (in “Framing: Toward Clarification of a Fractured Paradigm”) and Druckman, getting the facts is the way to limit the effects of framing (R. Entman, 1993).

Druckman and his colleagues collaborated in many other studies. These covered various political issues. All of this work, such as “Does Presidential Rhetoric Matter? Priming and

Presidential Approval" (Druckman JN & Holmes JW, 2004) and "Candidate Strategies to Prime Issues and Image" (Druckman JN, Jacobs LR, & Ostermeier E, 2004), show that framing is used in all political areas and presidential campaigns. However, it seems that each individual has the power to "control" the extent of framing's influence.

Another valuable contribution to this issue is Markel and Joslyn's work. Their "Gun Policy, Opinion, Tragedy, and Blame Attribution: The Conditional Influence of Issue Frames" (Haider-Markel DP & Joslyn MR, 2001) studies the impact of framing on public opinion using the example of the Colorado school shooting. The conclusion of this and the other studies reviewed here clearly shows the effect framing has on individuals.

Iyengar looks at political framing from a different point of view. He asks: Does political framing influence the news or vice versa? His studies include "Is Anyone Responsible? How Television Frames Political Issues" (1991), and with Kinder, "News That Matters: Television and American Opinion" (Iyengar & Kinder, 1987). But either way, it does not matter who frames whom - whether it is politics framing news, or the news framing politics: the outcome is the same. It is the public that is influenced. Public opinion, morals, social understanding, and tolerance are under siege from framing.

Apart from collaborating with Iyengar, Kinder (Kinder DR & Herzog D, 1993) produced his own work on framing. In "Democratic Discussion In Reconsidering the Democratic Public" (Kinder DR & Herzog D, 1993) and "Divided By Color: Racial Politics and Democratic Ideals" (Kinder DR & Sanders LM, 1996), he looks at democratic politics and racial politics. Matsuda also studied the latter and published "Public Response to Racist Speech: Considering the Victim's Story" (Matsuda MJ, 1989). All of these works describe the same issue: The less people are informed, the more influence framing yields, and the more bias it causes. Kinder and Sanders' publication "Mimicking Political Debate with Survey Questions: The Case of White Opinion on Affirmative Action for Blacks" (Kinder DR & Sanders LM, 1990) confirms this. Gamson et al. published similar research in 1987: "The Changing Culture of Affirmative Action" (Gamson WA & Modigliani A, 1987).

There are many more researchers who have studied the topic from different angles. McClosky and Brill, for example, published "Dimensions of Tolerance: What Americans Believe About Civil Liberties" (McClosky H & Brill A, 1983); Lipset and Raab wrote "The

Politics of Unreason: Right Wing Extremism in America, 1790-1970" (Lipset SM & Raab E, 1970). All of them confirm that with framing, the problem is that people respond to certain salient words.

According to research, in foreign policy, framing can have very strong effects. Trammell's 2005 study, "War on the Web: The Immediate News Framing of Gulf War II" shows how framing on the Internet influenced people's views on what happened and why (Trammell KD, 2005). Words are powerful, a point McKinnon makes in her 1993 research publication "Only Words." McKinnon, a civil rights activist and well-known professor of law, knows about the power of words. She understands how words are used in a psychological way to control political speeches and to influence the directions others are taking.

In a similar research publication, "Words That Wound: A Tort Action for Racial Insults, Epithets, and Name-Calling" (2002), Delgado mentions the same power. Words that hurt and influence can sway opinions. Edwards reaches the same conclusion in his research on bullying: "On Deaf Ears: The Limits of the Bully Pulpit" (Edwards III GC, 2003).

But in the context of framing, only a few commentators talk about what can be done to minimize, and possibly to avoid, being biased. Kuklinski et al. published "The Political Environment and Citizen Competence" (Kuklinski, 2001). This discusses the influence of framing on people's power and competence. Druckman and Nelson's research, "Framing and Deliberation: How Citizens' Conversations Limit Elite Influence" (Druckman JN & Nelson KR, 2003), and Druckman's "Political Preference Formation: Competition, Deliberation, and the (Ir)relevance of Framing Effects" pursue this issue (J. N. Druckman, 2004).

Other relevant studies include Eagly and Chaiken's "The Psychology of Attitudes" (Eagly AH & Chaiken S, 1993), and "Understanding Attitudes and Predicting Social Behavior" (1980) by Ajzen and Fishbein (Ajzen I & Fishbein M, 1980). The latter researchers consider whether people's attitudes can lead to predictions about their behavior. The answer is no. However, framing can influence behavior. Framing therefore has some influence on our intentions, and this in turn influences our attitudes.

Druckman, among others, looked at this issue of behavior. In 2001, he published a study of economic psychology and people's morals: "Evaluating Framing Effects" (Druckman JN,

2001a) Additional similar work includes Edward and Wood's study "The President, Congress, and the Media" (Edwards III GC & Wood BD, 1999), and Enelow and Hinich's "The Spatial Theory of Voting: An Introduction" (Enelow J & Hinich M, 1984).

Carragee and Roefs talk about "The Neglect of Power in Recent Framing Research" (Carragee & Roefs, 2004). In this work, they explore the lack of understanding about the way in which social movements and media coverage are linked together. Entman, in his 1993 publication "Framing: Toward Clarification of a Fractured Paradigm," confirms that ideas need to be linked, and more detailed information given, in order to weaken framing and strengthen overall communication (R. Entman, 1993).

Other notable research studies in this area include Arnold et al.'s "Framing the Social Security Debate" (Arnold DR, Munnell AH, & Graetz M, 1998); Callaghan and Schnell's "Framing American Politics" (Callaghan K & F, 2004); and Gross and Ambrosio's "Framing Emotional Response" (Gross K & D'Ambrosio L. , 2004). The last of these papers researches how framing is used to present the same issue in different ways to influence people's opinions. Gross and Ambrosio also find that the level of influence depends on the level of public prejudice. These two issues combined are often more powerful than we realize.

The research I have so far quoted refers mainly to politics and economics. Some of it also deals with racism. Researchers, however, have looked beyond these areas to judge the extent framing affects public opinion. An example of such work is "Media Discourse and Public Opinion on Nuclear Power: A Constructionist Approach" (Gamson WA & Modigliani A, 1989).

Nonetheless, most research focuses on politics, especially voting and campaigning. Studies that concentrate on these two topics include "The Effects of Canvassing, Telephone Calls, and Direct Mail on Voter Turnout: A Field Experiment" (Gerber AS & Green DP, 2000), and "Value Conflict, Group Affect, and the Issue of Campaign Finance" (Grant JT & Rudolph TJ, 2003).

The conclusions of such reports generally refer to the point already made: people who become involved in issues and learn about them are more likely to question received opinion and thereby resist the influence of framing. In fact, acquiring knowledge and forming one's

own opinions can be a pre-requisite to a healthier life, as Hirschman's study of 1989, "Having Opinions—One of the Elements of Well-Being," makes clear (HirschmanAO, 1989).

The issue, though, is not just about acquiring knowledge and becoming better informed. There is more to it than this. What people also need to do if they are to disregard framing is understand that media collaborate to frame the public. Examples of research in this area include: "Decision-Making in Democratic Politics: Attention, Choice, and Public Policy" (Jones BD, 1994); "The Political Culture of Ambivalence: Ideological Responses to the Welfare State" (Feldman S & Zaller J, 1992); "Spiral of Cynicism: The Press and the Public Good" (Cappella JN & Jamieson KH, 1997); and "The Mass Media and the Dynamics of American Racial Attitudes" (Kellstedt PM, 2003). Put simply, the conclusions are that greater public understanding limits the frame game.

Severin and Tankard (2001) even argue that to a certain extent, the concept of media framing presents a new paradigm to replace the older one of studying the objectivity and bias of the media. Watzlawik, Beavin, and Jackson, in their book "The Pragmatics of Human Communications" (1967), make a distinction between the command and report aspects of communication, with command referring to what is said and how it is said. This distinction emphasizes the assumption that how messages are understood depends on how messages are formatted. Gitlin (1980) studied this issue and linked the frame to news text by identifying the persistent patterns of cognition, interpretation, and presentation of selection, emphasis, and exclusion.

Framing is a concept derived from the study of media effects that began in the early 20th century. With the advent of new technologies such as radio and motion pictures, media content was able to reach ever larger numbers of people at one time. Social scientists began to notice that characteristics of the media seemed to affect the attitudes and behavior of the audience. Walter Lippmann's book, *Public Opinion* (1922), described the wide variety of realities available when individuals form mental structures, and how those realities are chosen based on media culture. This culture includes stereotypes, self-interest and altruism, the image of democracy, and the specific effects of newspapers (the dominant media at the time). Also, after World War I, people began to examine the propaganda that had been used

to such great effect during the war. The strategic effects of propaganda led to a fear of media influence during this first stage of media study (Scheufele, 1999, pp. 103-106).

The second stage began with World War II and ended in the late 1960s. Scientists rejected the idea of strong media effects which had caused so much concern during the first stage, and hypothesized that personal influence was the most important agent for social change. The effects of media, according to this theory, were minimal. However, this line of research was not supported in every study, and in the 1970s social scientists began to look again for strong media effects, shifting their focus from attitude change to cognitive changes that were prompted by mass media exposure. Finally, the idea of social constructivism/constructionism became popular in the 1980s, suggesting that both strong and limited effects of media existed. They began to realize that media effects were not simple, but included a wide variety of covariables that must be included (Scheufele, 1999, pp. 105-107).

Although social constructivist theory and social constructionist theory are very similar, there is an important difference between the two (Shaw, 1995). Social constructivism is the idea that media consumers construct individual mental structures of knowledge, while social constructionism goes further to describe a cycle of learning in which the constructed mental structures are then externalized so that they have an effect on the environment, then feedback from the environment is internalized, and the cycle continues (Shaw, 1995). Both of these viewpoints have been applied to the topic of framing effects.

Context or framing theory states that the audience's interpretation of a given news story will depend on the context of the story or the “frame” that is placed around it. Druckman (2001, p. 227) defines framing as the media's emphasis on certain aspects of an issue which causes individuals to focus on these aspects when making political decisions. For example, labels, metaphors, tone of voice, and comparisons can alter the presentation of a news story so that it will be perceived in a different way.

Anyone who has watched the same news events reported on different networks or in different media probably has an understanding of the framing concept, although it may be intuitive rather than conscious. Many questions must be asked in the preparation of a news broadcast or article: What words should be used? What additional information will be given?

Which images and video clips should be shown? The answers to these questions will determine the nature of the frame. For example, good/bad bias is one aspect of a story that is portrayed via framing. The frame package will present the news as positive, negative, or something in between.

Iyengar (1991) identified two types of framing: episodic framing results from news coverage based on individual events that exemplify issues, while thematic framing is based on collective information. His landmark study showed that when subjects viewed episodic news they tended to blame individuals for problems such as poverty or unemployment, but if the same information was presented in an aggregate form (national poverty or unemployment rates), subjects blamed outside sources such as the government. The fact that most news reporting is episodic can result in a "blame-the-victim" mentality and make it more difficult for the public to see issues as overall trends.

Reese (2007, pp. 148-154) proposed a model of framing that would bridge the gap between specific message attributes and the larger culture in which they exist. He defines frames as "organizing principles that are socially shared and persistent over time, that work symbolically to meaningfully structure the social world" (S. Reese, 2001). This definition gives little attention to the characteristics of the message receiver, such as prior knowledge, psychological variables, and mental architecture.

Benford and Snow (2000, pp. 611-639) used a slightly different definition of frames in their study of framing and social movements. In this context, "collective action frames are action-oriented sets of beliefs and means that inspire and legitimate the activities and campaigns of a social movement organization" (Benford & Snow, 2000, p. 613). They identify four important framing tasks: diagnostic framing, which defines problems; prognostic framing, which proposes solutions; motivational framing, which motivates people to take action; and adversarial framing, which tells people who their enemy is.

Kahneman & Tversky (1984, pp. 341-350) report on a study of framing effects in which two scenarios of disease were presented to subjects: the first scenario was framed in terms of survivors, while the second was framed in terms of deaths. They found that subject preferences were different in the context of the two frames, even though the action choices

were identical except for the way they were expressed. They note that this result flies in the face of rational choice (D. Kahneman & Tversky, 1984, p. 348).

Iyengar (1991, pp. 11-16, 26-28) found that framing influenced perceived responsibility for problems such as unemployment and crime. When frames focused on individual cases or specific events, they were termed episodic frames; in contrast, political news placed in context was called thematic framing (Iyengar, 1991, pp. 27, 32).

Edy & Meirick (2007, pp. 119-141) studied the effects of naturally occurring frames (i.e., not artificial frames used in laboratory experiments), specifically U.S. media coverage of the 9/11/2001 attacks. During late October of that year, the news media were framing the attacks in two different ways: as an act of war and as a crime. Even George W. Bush, in his first address to the nation following 9/11, used both ideas. This is a good example of complex framing in real life. The authors sought to determine which frame individuals would choose (if any) and how their chosen frames would affect their support for the war in Afghanistan. They also planned to investigate the nature of framing in relation to agenda-setting and priming: did these media effects use the same psychological mechanism? Their hypotheses were as follows: 1) support for the Afghan war would be greater for war-frame adopters; 2) under adverse conditions (e.g., excessive civilian casualties), support for the war would decrease more for those who espoused the crime frame; 3) the frame subjects adopted would be related to demographics and social location; and 4) frame adoption would explain more variance than demographics and social location. The latter would be covariates, but the main variable was the frame (Edy & Meirick, 2007, pp. 121-130).

The results indicated that a large percentage of individuals did not adopt either frame, and up to half adopted a mixed frame with varying amounts of “war” and “crime.” For those who did take on a pure crime or a pure war stance, hypothesis 1 was supported, with significance of $p<.05$. However, hypothesis 2 was not supported by the data, as tested using chi-square. Hypothesis 3, which referred to demographics and location, was partially supported. There was no significant difference according to race and gender, but ANOVA did indicate significant differences by income and political ideology, with location (Southern) a confounding variable for the latter. Hypothesis 4 also garnered some support, showing the complexity of frames in real life (Edy & Meirick, 2007, pp. 136-139).

Zhou and Moy (2007, pp. 79-98) investigated the relationships between public opinion and media coverage in the context of the Internet. Content analysis of 206 online posts and 114 news reports on a socio-political event in China was examined to test associations and possible causal connections between the salience of opinion frames and media frames. Results showed that online public opinion played a significant role in bringing a local event to national attention, as well as frame-building in early media coverage. As coverage continued, the media altered the online frames to better suit their needs. These two processes supported the idea of frame interaction effects. But this change did not affect the online posts themselves – public opinion as viewed through the internet was not constrained by the media. The authors concluded that "netizen" autonomy may significantly constrain media frame effects (Zhou & Moy, 2007).

For some theorists, framing is a part of agenda-setting, in which repetition and accessibility determine what issues people think about the most. McCombs et al (1997, pp. 701-717) expanded the theory of agenda-setting by their study of the 1995 elections in Spain. They examined framing as a second-level effect, in which mass media influences the public's attention to various aspects of the important issues as determined by first-level effects. Content analysis of local and national newspapers as well as national television showed that certain attributes of the candidates were emphasized by the media (emphasis on attributes was considered to be framing) and that this emphasis was correlated with voters' descriptions of the candidates: for local newspapers, +.70, national newspapers, +.81, and national television, +.54. The authors postulate that the media produced first-level effects (agenda-setting) and second-level effects (framing) by increasing the salience of the candidates and of their attributes (McCombs, et al., 1997, p. 714).

However, Scheufele (2000) argued that agenda-setting, priming, and framing do not use the same mechanism and should not be studied together as if they are conceptually identical. Framing is determined by the labels and descriptions used for an issue and is dependent on attention, while exposure may suffice for agenda-setting. Agenda-setting stimulates a person to think about a person or issue, but framing (and, to an extent, priming) causes a person to form connections and mental structures regarding the issue (Scheufele & Tewksbury, 2007). The study by Edy & Meirick referenced above (2007, pp. 119-141) also revealed a separation between agenda-setting mechanisms and framing mechanisms.

Entman (1993, pp. 51-58) refers to framing as a "fractured paradigm," since framing in the early 1990s had not been developed into a full theory. He states that framing is a task of selection and salience. A frame selects certain aspects of reality (e.g., a candidate or political issue) and makes them more salient so that the audience uses those aspects for problem definition, causal interpretation, moral evaluation, or solution recommendation (Robert M. Entman, 1993, p. 53). Frames most commonly diagnose, evaluate, and prescribe. They can occur at four positions in the communications process: communicator, text, receiver, and culture. Increasing salience is a process in which pieces of information are made more noticeable, meaningful, or memorable to the audience. Examples of methods to increase salience would include placement, repetition, association with familiar symbols, word choice, emotional tone, etc. Entman (1993, p. 54) notes that frames serve to prime values differently, increasing the salience of one over others. This is an explicit connection between priming (part of agenda-setting) and framing.

The constructionist approach was applied to framing by Baldwin van Gorp (2007, pp. 60-78) as a means to return overall cultural context to a concept that had been broken down into small, discrete units by previous authors. In this approach, frames are used by the producer to shape content, then by the receiver to construct an internal schema, forming a linkage between producer and receiver. This linkage is created by the shared collection of frames held by a culture (2007, p. 61). Social constructionism posits a cycle of interaction between the producer and the receiver; according to van Gorp, the interaction is found at the level of culture.

Van Gorp (2007, p. 62) suggests that frames should be studied as separate from the individual but integrated into a culture. A "cultural stock" of frames implies that some frames are not currently in use, frames are not explicit in media content, frames are often unnoticed, they are not the same as schemata (mental structures), frames have persistent characters, and social interaction is the basis of framing. When journalists invoke a cultural frame, they construct a "framing package" (van Gorp, 2007, p. 64) which is made up of framing devices such as word choice, emotional tone, visual images, reasoning devices such as justifications and causes, and implicit cultural themes.

Framing is “metacommunication” in that it lies in a symbolic level other than that of the actual content of the message. A wide variety of news stories could be linked by one cultural theme such as freedom of speech: an anarchist rally, suppression of web sites, burning of sacred books, economic “propaganda,” or the selection of state-approved textbooks. The reasoning devices that connect the meta-level with the content-level relate to Entman’s four functions of frames (1993, p. 53). Using the constructionist approach, framing as compared to agenda-setting and priming is seen as the bridge between individual cognition and societal culture (van Gorp, 2007, p. 75).

Chong and Druckman (2007a, pp. 99-118) described a theoretical basis for framing effects using an equation for attitude formation called an “expectancy-value conception.” The equation indicates that attitude towards an object is a weighted sum of a series of beliefs that evaluate the characteristics of the object. Using this perspective, there are two ways to change an individual’s attitude: one, change the evaluative beliefs, or two, change the weights or saliency of the beliefs. Framing can affect attitudes in both ways – by introducing a new belief and giving it priority, or by increasing the salience of certain prior beliefs. The beliefs that a person uses to evaluate an object must be available, accessible, and applicable/appropriate (Chong & Druckman, 2007a, p. 108). To be available, a concept must be stored in memory; to be accessible, the individual must be able to retrieve it from memory and apply it to a given evaluation. Saliency is highly important, because an accessible belief will be overshadowed by another accessible belief that is more salient. The concept of “applicability/appropriateness” is increased when a belief is consciously viewed as stronger or more relevant than another belief. This is the persuasiveness of a frame, or “framing potency.” Chong and Druckman (2007a, p. 109) note that motivation and knowledge increase conscious deliberation, while less knowledgeable and less motivated individuals rely on simple exposure and credibility of sources.

This theory implies several hypotheses, as set forth by Chong and Druckman (2007a, pp. 110-111). First, the theory predicts that framing will have a greater effect on knowledgeable persons; second, strong prior attitudes will lessen the effects of framing. Repetition of a frame will increase both availability and accessibility of the concepts embodied in the frame. The response to frames can differ in competitive and non-competitive environments: motivated individuals will only respond to strong frames in both environments, but less

motivated persons will respond to both strong and weak frames in non-competitive environments but will discriminate between strong and weak in competitive environments. Finally, the authors predict that in a competitive context, conscious deliberation may cause a countereffect in which a weak frame backfires (Chong & Druckman, 2007a, p. 111).

Claes de Vreese (2005, pp. 51-62) described an "integrated process model of framing" in order to examine content and framing effects simultaneously and to classify them as generic frames or issue-specific frames. He discussed three stages of the framing process: frame-building, which takes place through an interaction between journalists/elites and social movements, frame-setting, which derives from the interaction between media frames and the prior knowledge and beliefs of the audience, and the consequences of framing at the level of the individual as well as the culture. It is impossible to adequately discern framing effects based on only one level of analysis, or based on a static rather than a dynamic perspective (de Vreese, 2005, pp. 51-52). Like many other authors, de Vreese examines the definitions of framing put forth by his predecessors and concludes that framing refers to the salience of particular aspects of a topic, as opposed to agenda-setting, which is salience of the topic itself; thus, he is in agreement with McCombs (McCombs, et al., 1997), Chong & Druckman (Chong & Druckman, 2007a), and others, although he leaves out some aspects that they may include.

De Vreese (2005, pp. 54-55) describes the difference between "issue-specific frames," which are applicable only to certain topics or events, and "generic" frames, which relate to different topics, perhaps even different cultures. For example, Shah et al. (2002, pp. 339-370) found three dominant frames near the end of U.S. President Clinton's second term of office – "Clinton behavior scandal," "Conservative attack scandal," and "Liberal response scandal." It is obvious that these frames could not apply to a different issue. On the other hand, Semetko and Valkenburg (2000, pp. 93-109) described five generic news frames: "conflict," "human interest," "attribution of responsibility," "morality," and "economic consequences." They found that these frames were related to journalistic traditions and were widespread in the Western world but some were used more often in particular cultures (Semetko & Valkenburg, 2000).

The constructionist approach to framing includes the idea that there are constraints on the power of a frame, since it is dependent on the audience's cognitive processes. A recent study by Valenzuela (2011, pp. 437-463) related the effects of issues in the news to values already held by viewers. The results indicated that agenda-setting effects are stronger when the issues that are promoted fit the values and beliefs of the audience. There was a clear resistance to news media influences when issues and values did not match. This provided new support for the importance of individual characteristics in the effects of news media.

Druckman and Nelson (2003, pp. 729-731) studied the effects of interpersonal interactions, i.e., discussions of politics with family and friends, in modulating the strength of framing effects. In a three-condition experimental design, subjects viewed a news report and were placed randomly in a no discussion, unmixed discussion, or mixed discussion group. In the unmixed discussion group, all of the participants had similar attitudes prior to the study, whereas the mixed discussion group included subjects with differing attitudes. Druckman and Nelson found that subjects placed in a mixed discussion group after a news presentation were much less influenced by the framing and other characteristics of the presentation than were subjects in no discussion or unmixed discussion groups.

Hoeller (2010) examined frame-building processes in the Austrian National Election Campaign of 2008, asking the research question "Who frames the campaign?" The author noted that mediatization of politics in Austria, the "rising relevance of mass media in [a] political system," was described by three factors, the merging of medial, political, and social reality; the increasing perception of politics through the media, and the adaptation of political behavior to the rules of the media. This study compared media logic (based on content analysis of four newspapers) and party logic (content analysis of the press releases from five parties). Content analyses focused on six framing measures of three overall trends: entertainment, negative bias, and destructiveness. Thus, the investigation concerned both the macro-level (media logic/party logic) and the meso-level (communication logics of the particular parties and newspapers) of the campaign (Hoeller, 2010).

The author's (Hoeller, 2010) theoretical stance predicted that media coverage would have a higher level of entertainment than the press releases, as well as greater negativity. She also predicted that communications from the parties would be more destructive than media

coverage. The findings were surprising, because there was no significance between media and party with regard to negativity – both were highly negative and focused on the incompetence of leaders – and the expectation of higher entertainment in the media coverage proved to be the exact opposite. The author concluded that, since news stories were matter-of-fact 70% of the time, and only 50% of the press releases were fact-based, the parties tended to use emotional arguments in their communication. The hypothesis that party communications would be more destructive (i.e., conflict-oriented) was supported by the data, since 92% of press releases only showed one dimension, compared to 69% of the news stories. However, the latter figure is high, considering that the media often claims to be unbiased (Hoeller, 2010). Finally, in answer to the question, "Who frames the campaign?" Hoeller determined that since the media logic and party logic were independent, the media framed the campaign (Hoeller, 2010).

While some communications researchers have chosen to investigate framing in isolation, others see framing as just one of a group of variables that can affect public opinion. In 2007, Chong and Druckman (2007b, pp. 637-655) published a study that investigated the ability of audience characteristics, message variables, and competitive environments to alter the magnitude of framing effects. Based on theoretical considerations, they hypothesized that frame strength, context (one-sided or two-sided), and the availability, accessibility, and applicability of individual schemas would interact to vary the effects of framing. Frame strength as a construct was determined by pretesting with subjects that were representative but did not participate in the final study. The results indicated that the magnitude of framing effects was dependent on frame strength more than on context, and that competition altered but did not cancel out the effects of framing. Despite previous research emphasizing that individuals tend to favor issue frames that match their prior values (Valenzuela, 2011, pp. 437-463), Chong and Druckman found that a strong frame can change their minds when compared with a weak frame. When both frames were strong, subjects moved toward middle ground positions. Weak frames had little effect except in the no-competition and less-knowledgeable condition.

In 2006, Berinsky and Kinder (2006, pp. 640-656) performed an experiment to determine how certain characteristics of news stories can alter memory, issue salience, and policy judgment. The news story studied was an adaptation of newspaper reports on the crisis in

Kosovo. Subjects were randomized into three possible conditions: first, the control condition, second, the pro-U.S.-intervention condition, and third, the con-U.S.-intervention condition. As expected, the facts subjects recalled varied according to condition, in a direct relationship. The importance of particular issues was also directly related to condition, but judgment of U.S. policy showed little difference, a result which was contrary to that expected (Berinsky & Kinder, 2006, pp. 640-656).

In 2002, Shah et. al. (2002, pp. 339-370) examined presidential approval ratings in the light of news coverage (news about the economy, presidential policy, and scandal), opinion polls over time, and a measure of economic success (estimates of real disposable income). News reports from 1993 to 1999 were analyzed for approval/disapproval in coverage of the three topics listed above. Using an ideodynamic model, they devised an equation that computes the overall persuasive force present in news media coverage, with its strength representing the likelihood that nonbelievers will be swayed to a different viewpoint. This equation explained changes in the president's approval rating, along with the framing of news stories concerning the economy, policy, and scandal.

Attribution effects were investigated further by Shah et. al (2004, pp. 102-120) in an experimental study of the complexity of subjects' responses based on a loss vs. gain frame and an individual vs. societal attribution frame. Previous research showed that most people avoid risk when presented with a gain-emphasizing frame but take more risks in the context of a loss-emphasizing frame. Based on theoretical considerations and empirical data, the authors expected complex interactions between the two frames, specifically that both the individual-loss combination and the opposing societal-gain combination would produce more complex cognition than individual-gain, societal-loss, or mixed-gain and mixed-loss frames. These two expectations were partially confirmed; the individual-loss combination clearly produced more complexity than the individual-gain, and the societal-gain condition clearly produced more complex cognition than the societal-loss. However, when individual-loss and societal-gain were compared to the other four frame combinations, the relationship was less clear. Differences could be seen in the data, but these differences were not statistically significant.

Using a complex variability model, Valkenburg et. al. (1999, pp. 550-569) conducted a study to determine the effects of frames on readers' thoughts about news stories and about recall of the facts. Subjects were placed in one of five groups: no frame (control), conflict frame, human interest frame, attribution of responsibility frame, or economic consequences frame. Two news stories were used with each frame. Analysis of the data revealed that the use of frames did not change according to story, but there was an interaction between use of frames and the story, i.e., the economic frame was used more for the Euro story. The conflict and human interest frames were used more often regardless of the story. Recall of the facts was affected by both story and frame; the most significant effect was lower recall for the human interest frame. The authors suggested that this unexpected result might have come about when emotions evoked by the human interest story overwhelmed the facts themselves (Valkenburg, et al., 1999, pp. 566-567).

In 2004 de Vreese (2004b, pp. 194-214) published the results of a two-wave experiment to determine the effects of strategic news framing, with covariates of political knowledge and political efficacy, on political cynicism and support for issues. Strategic news framing was defined as news coverage that emphasized the motivations and personalities of the candidates, disagreements that occurred between parties, candidates, or voters, and extensive use of poll results. He noted that strategic news coverage was increasing, which in turn increased negative perceptions of political campaigns. The hypotheses to be tested included the following: 1) strategic news would increase political cynicism more than issue-based news, 2) strategic news would increase negative thoughts and decrease positive thoughts regarding the issues, and 3) strategic news would suppress voter support for the policies it described. Also, the effects of cynicism and policy support were examined for persistence over time. The results indicated that strategic news framing had a robust effect on cynicism, even when the effects of prior knowledge and political efficacy were considered. It also produced a statistically significant increase in negative thoughts, and a corresponding decrease in positive thoughts, although the latter effect was not significant. The third hypothesis, regarding policy support, was not confirmed by the results. The increases in cynicism were persistent over time, although their magnitude decreased (de Vreese, 2004b, pp. 194-214).

Data from the two-wave experiment described above were subsequently analyzed to characterize the frame effects of TV news stories on three constructs – audience interpretations, relative salience of frames, and policy support (de Vreese, 2004a, pp. 36-52) Two versions of the experimental news program were presented to subjects, one with a conflict frame and the other with an economic consequences frame. In order to examine relative salience, the news story was separated into two parts, frame and core news facts. He hypothesized that audiences would react to a news frame by thinking about the news story in terms of the frame. Prior political knowledge and issue elaboration were identified as covariates. Additionally, the relative importance of the news frame and the effect of the frame on policy support were examined. The results confirmed the hypothesis, showing that subjects readily accepted the experimental frame as a guide to thinking about the issue. The covariates did not significantly affect this result. The importance of the frame was found to be as strong as that of the core facts, suggesting that news framing has a robust effect. However, as indicated by the prior de Vreese study (2004b, pp. 194-214), there was no difference in policy support between the two experimental frames.

Research into framing effects, their theoretical bases, and their interactions with other individual and cultural variables has been steadily increasing over the past thirty-five years. Framing is no longer considered to be a simple, isolated effect, but a complex pattern integrated into every part of society that is touched by the media. Still, there is much research to be done. The theories of framing, including second-level agenda-setting (McCombs, et al., 1997, pp. 701-717), Chong & Druckman's (2007a, pp. 99-118) expectancy-value summation, and social constructionist theory (van Gorp, 2007, pp. 60-78), have set forth their predictions concerning framing effects, but empirical support is incomplete. For example, Chong & Druckman gave seven specific hypotheses about framing potency, few of which have been directly investigated. Other studies would benefit by replication, e.g., Valenzuela's study which showed that framing effects were stronger when they matched viewer values (2011, pp. 437-463).

Frames, as it is obvious from the above extensive literature review, have a prominent place in this study. As we will see in Part IV of the research, where I address issues related to the operationalization of utilized theories, I use frames in order to understand the content which was gathered during the process of the data collection. Hence, based on countless well-

founded research on framing and framing effects, I provide my own definition of frames. This definition was already briefly discussed in the introductory part of the thesis. Yet, I believe that the definition should be revisited now and discussed in greater detail.

I define frames as perspectives through which factual evidence is seen or interpreted. Hence, frames could be represented in one simple word or in a complex text. Additionally, I believe that with increasing complexity, assuming that they remain within the boundaries of comprehensibility, frames become increasingly powerful. Furthermore, I argue that a frame, remains weak as a single entity. Frames, in order to become influential, must be confirmed with kindred frames continuously and with high frequency over a certain period of time. Most importantly, frames, in order to become salient, should be supported with uncontested factual evidence over a long period of time. Only through continuous repetition and aggregation and in the right context, can certain aggregated frames or framing groups become more salient than others, and hence, dominate public opinion. Alongside with aggregated salient frames, other frames and framing groups exist to which I refer as counterframes. Unlike aggregated salient frames, counter frames appear with lower frequency and with disrupted continuity. Most importantly, the interpretations of facts, provided within these frames deviate from factual evidence significantly. Furthermore, I believe that time matters. The longer the aggregated salient frame remains confirmed by the factual evidence, the stronger its influence on opinion formation. With time passing, the influence of counterframes in comparison to aggregated salient frames diminishes and at a certain point is omitted completely. Furthermore, after a critical point is reached in time, counterframes are perceived as part of aggregated salient frames and generate effects identical to aggregated salient frames. I argue that with a change of factual evidence the influence of dominant frames diminishes. Accordingly, the change in factual evidence reduces influence of aggregated salient frames over opinion formation. However, in order for this diminishing effect to become observable, the change must be sufficient in time.

In the next step, clarification of terms used in the above definition of frames is necessary.

Factual evidence: In this definition, factual evidence is everything that is uncontested fact for the absolute majority of TV viewers, radio listeners or web users. An attack on the Twin Towers on the 11th of September in 2001, or the earthquake and later tsunami which caused

the Fukushima power plant meltdown can be considered as factual evidence. However, how we interpret what happened is a matter of perspective.

Frames in words or in work combination: For me, the definition of frames provided by Entman is classic (R. Entman, 1993). At the same, however, I am a proponent of the belief that frames do not necessarily need to have all the components listed by Entman in order to be qualified as a "complete" frame. In my opinion, a simple sentence or even a simple word (depending on the context used) could constitute a powerful frame with high influencing potential. The confirmation that words matter as frames is provided on a daily basis in different global marketplaces where investors, when reacting to some announcements, barely have time to make an analysis of complex texts and are depending on short cuts and heuristics of words. So, the existence of simple words in text such as "bad" or "good" can make a significant difference.

Kindred frames: As I never saw this term used in other research on framing, I owe readers of this thesis some clarification. For me, there are three types of framed texts which I have observed. These are positively, negatively, and neutrally framed texts. I believe that positively or negatively framed text, independent of its importance, cannot have a sustainable effect on the audience until it is confirmed by "kindred frames" in following minutes, hours or days. Let me clarify this by an example: the announcement that there was a catastrophic event in the Fukushima Daiichi power plant is a very powerful frame with frightening effects. However, its effects cannot be sustained unless other news announcements or reports confirm the initial frame which is that what happened is catastrophic. I argue that we need a consequent chain of similarly framed news in order to achieve "desirable" effects.

Aggregated salient frames: This term is directly connected to the term "kindred frames." The confirmation of initial frames with subsequent kindred frames, I argue, leads to the development of a major framing effect. Kindred frames simply aggregate their effect on audiences and become salient.

Counterframes: I define counterframes as the opposite of aggregated salient frames. To recall our Fukushima Daiichi example: the major framing line during the months after the catastrophe (that is, the aggregated salient frame) was that what happened was a very

negative occurrence in many different aspects. However, there also existed other opinions arguing that what happened was not as bad as thought by the majority; these were counterframes. It has to be noted that for my definition counterframes are always weaker in their effects on audience than aggregated salient frames, and this example certainly illustrates that.

With this, we conclude our introduction to framing and move on to the next chapter, which displays the differences between the old and new ways of news proceedings and why that matters.

2.5 Information Asymmetry

The problem we address here is the problem of information asymmetry. This issue is one of most important concepts for the present study. The 2001 Nobel Prize was awarded to George Akerlof, Michael Spence, and Joseph Stigiltz for their work exploring the economic implications of asymmetries of information. According to these researchers, asymmetries of information arise in connection with political processes and have important consequences in that realm (Stiglitz, 2002, p. 27). Just as such asymmetries allow managers the discretion to pursue policies that are more in their own interests than in the interests of shareholders, so asymmetries allow government officials the discretion to pursue policies that are more in their interests than in the interests of the citizenry (Stiglitz, 2002, p. 28).

Stiglitz notes that improvements in information and the rules governing its distribution can reduce the possibility for these abuses in both business and in political processes. In the markets, analysts and monitoring agencies play a crucial role in providing information. According to Stiglitz, the United States Securities and Exchange regulations expect the disclosure of different types of information for the purposes of reduction of information asymmetry (Stiglitz, 2002, p. 28).

Furthermore, Stiglitz notes that free speech and a free press not only make abuses of governmental powers less likely, they also enhance the likelihood that people's basic social needs will be met (Stiglitz, 2002, p. 28).

Stiglitz sees information in many respects as a public good. According to him, whatever relevance the knowledge of the balance of payments has for the actions of various participants in the economy, the use of that information has a zero marginal cost. Furthermore, he notes that as in the case of other public goods, government has an important role in the provision of information. The most important statement in this case for us is that according to Stiglitz, in a modem, complex economy, contrary to the standard theories of conventional (pre-information theory) economics[6], prices do not convey all the relevant information (Stiglitz, 2002, p. 40).

[6] The relevant theoreies, such as Efficient Makret Hypothesis will be reviewed later in this thesis.

Stiglitz argues that this information not only influences the decisions of the private sector, for instance, with respect to production, but also affects people's decision making about the government. If data shows that unemployment is soaring, they will be concerned that the government's macroeconomic policy is wrong. If data indicates that inequality is going up, then their concerns about distribution policies and whether the government is doing enough to help those in need will be heightened (Stiglitz, 2002, p. 29). Thus the government sometimes has a desire to conceal this information. Sometimes the beneficiaries of manipulated information may not be the government directly, but certain groups in whose interests it works. (Stiglitz, 2002, p. 29).

Thus, Stiglitz argues that it may be important that statistical data be collected by independent statistical offices rather than by state agencies and interest groups. Despite the fact that a huge number of variables exist that could be monitored, monitoring is expensive and the scope of attention is very limited. Thus, government officials choose to monitor variables that showcase their agenda or the agenda of special interests they might be serving, and not to monitor variables that are adversely affected by that agenda (Stiglitz, 2002, p. 29).

While the analysis of information asymmetries has brought new light on the relationship between governing and governed groups, the most important insights have long been part of the thinking about democratic processes in general. In democratic societies people have a right to be informed of, to deliberate on, and to speak out about what the elected government is doing and why. Stiglitz argues that democratic societies have a presumption in favor of transparency. But there has also long been consensus that on their own, governments do not have the will to disclose or openly promote information that is contrary to their particular interests (Stiglitz, 2002, p. 29).

Stiglitz often speaks of government being accountable to the people, but if effective democratic control is to be reached, then the voters have to be informed: they need to know what different actions are available and what the outcomes might be. Governments typically have access to much more information relevant to decision making than those outside political elite do. Recognizing the utmost importance of information for an effectively working democracy, modem free societies try to protect the freedom of the media and try

to promote independent institutions, all to provide an effective check on government (Stiglitz, 2002, p. 31). Stiglitz sees it as the major problem that officials often are the only or major source of crucial information (Stiglitz, 2002, p. 31).

Stiglitz notes that the above is true both with respect to discussions of policy and of data. He argues that most of the information that is gathered is itself a public good. If the government does not provide correct data, nobody will, or they will be supplied in insufficient quantities in a way that creates information asymmetry. Political elites developing policies that have the effect of increasing social imbalance will not want information to become known that points toward the policies' negative effects on equality. At the same, politicians often think that if they can establish a consensus behind a particular policy behind the closed doors, then it will be easier to resist opposition (Stiglitz, 2002, p. 31).

The problem of information transparency is arising not only between the governments and citizens but also between private companies and consumers. Private companies often lack the incentive to disclose fully the ingredients of their products (whatever the products might be) and government, similarly, enforces different information disclosure requirements. Improvements in the information supply can reduce the scale the information asymmetry problems (Stiglitz, 2002, p. 31). But this might lead to a problem on the political side. Let us consider that the voters in a democratic society face this kind of information disclosure problem.

Voters, at least according to Stiglitz, have a limit to the amount of time and enthusiasm they are willing to invest in protecting the public interest. Secrecy raises the price of information to be paid by inducing more voters who do not have special interests not to participate or engage, leaving the field broadly open to those with special interests and knowledge. Thus not only do special interests exercise their nefarious activities under the cloak of secrecy, but the secrecy itself discourages others from providing an effective check on the special interests through informed decision making (Stiglitz, 2002, p. 33).

In further reading Stiglitz states that while making decision behind the closed doors may be in the interests of the governing political elite as a whole, it is not in the interests of particular individuals. Indeed, this is why information leaks. As in the case of other forms of collusive behavior, individuals are prone to deviate. If a secret is shared among people, any

of the individuals involved can reveal it to the news media. If the decision making process is not disclosed, and especially if it is driven by particular interests, those who genuinely oppose the decision may feel that the only way that a "better" decision will be made is to make this information publicly available (Stiglitz, 2002, p. 33).

The more mistakes, the more defensive public officials are, the more protective of themselves and the more secretive, narrowing the circle still more, the lower the quality of decision making. As the circle of informed agents on secret issues diminishes in scope, attention focuses more and more on value issues. Making judgments about complex economic issues takes an enormous amount of information, while coming to a view on abortion or family values takes far less, or a far different kind of information. Therefore, information asymmetry distorts the public space. They consequences of secrecy are manifold: not only are crucial areas of public policy dealt with unsuccessfully, but also public debate focuses solely on issues that are often far more discordant (Stiglitz, 2002, p. 34). Such a process discourages public participation in public debate and causes distrust between government and voters. Additionally, it strips from the mass media the ability to provide successful checks against government misbehavior (Stiglitz, 2002, p. 34). By undermining trust this way, and taking advantage of seemingly democratic processes, it feeds those who argue against democracy. At the same, Stiglitz believes that special interest groups that provide financial support do not do so for the purpose of increasing information transparency, but because they think that by doing so they can change policy in ways that increases their profits and net worth (Stiglitz, 2002, p. 34). If these actions are subject to public investigation, the circle of favoritism, as Stiglitz puts it, is greatly limited. Secrecy is the main source of eternal corruption, which discredits democratic governments in so many countries (Stiglitz, 2002, p. 34).

The increase of the work force involved in gathering, processing, and disseminating information points towards its importance. Stiglitz notes that many of these people are engaged in taking information out of the public sphere, information that one might argue should be available to everyone. If high quality information leads to efficient resource allocation, does it make sense for the government to deliberately not disseminate information instead of letting the market itself decide what is or is not important? According to Stiglitz, if the information being discussed or disclosed is of importance, that is, it affects

economic situation, then disclosing the information as soon as possible and to as many people as possible allows for the most efficient allocation of available resources. If some political decision might have economic consequences, then it is necessary for market participants to appraise the probability of available options for themselves. Asymmetric information dissemination deprives them of the information they need to make those weighty decisions (Stiglitz, 2002, p. 37).

Stiglitz points that central banks are a great example of a broader set of challenges facing democratic societies today. Democratic societies must find, and in most cases already have found ways of engaging expertise in difficult and technical decision making in a way that reflects both common values and expertise. Because of the complexities of many issues, many countries have delegated responsibility for making critical decisions (Stiglitz, 2002, p. 37). However, the decisions made cannot reflect only the interests of the participants, who probably have a disproportionate share of experience and knowledge, but should be forged in ways that leave both the decisions and the framework within which they are made open to democratic deliberation. In many realms, regulatory processes reflect these concerns (Stiglitz, 2002, p. 37).

The information that public officials gather and process is intellectual property in the same way that a patented innovation would be. Using that intellectual property for private purposes is just as serious an offense against the public as any other appropriation of public property for private purposes (Stiglitz 2001).

According to Stiglitz, the mass media is among the most important of information institutions. Like any institution, the mass media faces incentives, not all of which work to support the quality of information and the transparency of policy-making (Stiglitz, 2002, p. 40). The mass media must be trusted not to disclose the sources of their information. If journalists reveal their sources, these sources will not provide any further information in the future. Consequently, if the identity of the source of a leak becomes public knowledge, others within the governing elite are likely to punish the individual, depriving that person of access to information. At the same time, leaks and sources can be used in a negative way in order to discredit the concept of free media in a society. Hence, leaks can be advantageous but at the same disadvantageous: they are an important way for getting information that

would otherwise be concealed from the public domain and an important way for government institutions to shape coverage in a manner that advances their own interests. Leaks may lead to more high quality information, but also to more manipulated information (Stiglitz, 2002, p. 41).

Besley et al. also look at the problems of information asymmetry but from a different angle. According to Besley et al. in order for information generated by the media to be of good value, it needs to cause an appropriate collective response. Besley at al. believe that this may be possible even in autocratic societies; however, it is more likely to happen in a country with a democratic public sphere. In a democracy, citizens require information that they can use to elect politicians who serve their needs and to reject those who do not; otherwise formal democratic structures will fail to work properly. While most countries have some form of media outlets, their existence is does not provide any guarantee that they are effective instruments for critical scrutiny of the political elite. Media outlets must have real information that they are willing to print or broadcast (Besley, et al., 2002, p. 45).

2.6 Information Processing

In this chapter, we will try to understand the role of information processing mediatization theory. First, we will look at what I call “old ways of information distribution” and issues of these old ways’ compatibility with the new Internet age or the new age of mediatization. Then we will analyze new ways of information distribution and look at how they have changed society. At the same, we will discuss the role of speed in information distribution. As we will see in this chapter, I believe that speed, and particularly, the increasing speed of news distribution, is one of major characteristics of any highly mediatized society. Finally, and most importantly, this part of the research will introduce and discuss the information diffusion loop and its meaning for the entire report.

2.6.1 Information Distribution the Old-Fashioned Way

Going to a kiosk to buy your newspaper is a very old-fashioned way to get information about the surrounding world. I personally do that very occasionally and only when I have some

long ride on a train ahead and forgot to take an entertaining read with me from home. Having the news delivered in printed form in front of your flat, home or office or in your mail box outside of the building you occupy is still a very common way of information distribution – at least in the country where this research is done, that is, in Switzerland. Still, I think it is correct to argue that these means of news distribution are increasingly outdated. Development of new technologies such as iPads and various forms of tablets is a major cause of print-version subscription cancellation in favor of digital content. This doesn't seem to be a major trend yet. Printed newspapers dominate the distribution market at the time of this writing, but I think it is an guess to say that the shift towards digital subscription is and will become an even stronger trend in years to come.

Printed newspapers and books on the one side and digital newspapers and books on the other, both have their own advantages and disadvantages. The advantage of one sometimes seems to emerge out of the disadvantage of the other. It is probably correct to claim that the major argument of those who favor the printed press to digital subscription is rather sentimental. They argue that holding information in their hands, feeling it, is an experience one cannot replace with digital formats and, hence, is something that will be missed if it is completely replaced. One of the most important arguments of the research in this thesis is the claim that sentiment is a major driving force of nearly every decision making process. The sentimental reasons for not abandoning print newspaper subscriptions cannot be taken lightly. In the end, it is general sentiment that decides the fate of any new product on the market, and I am sure digital subscriptions will not be an exception. To sum it up, we have on the one hand somewhat romantic sentiment as opposed to convenience. For instance, a Berliner format newspaper is hard to hold in your hands, yet a digital tablet is easy to handle. Therefore, the major reason for retaining the printed version subscription is probably not rational but romantic. Further, we have to deal with ecological issues: by printing newspapers, one could argue, we destroy huge amounts of trees and harm our ecological system. By switching to the digital versions, we will solve this problem. But in solving one we could cause many others: we are not exactly sure how environmentally friendly the materials used in tablets are. Further, we might ask, how good are the salaries and working conditions in factories where these tablets are produced?

All ecological and social responsibility issues aside, the biggest problem of the print version newspaper, at least in my opinion, is the speed of information distribution. The information in morning newspapers, by the time they reach us, are at best four to six hours old. In our times, when some breaking news can become outdated in several minutes (this happens weekly in different stock markets), one might ask what advantage is there to reading such information at all?

It is a matter of fact that the digital world is affecting and changing old business models which have existed for decades and even for centuries, and such effects are observable worldwide. For instance, on Christmas of 2011 the decades-long tradition of not printing newspapers on Christmas day was broken in Great Britain. The tradition was introduced in 1912 by the consensus of newspaper publishers that not printing newspapers on that date would give newspaper reporters a day off. It took a digital revolution to change this tradition. On the 25th of December in 2011 the Sunday *Times* offered its readers a digital only version of the newspaper. Analysts are sure that further advancements in the various forms of tablets will cause the declining numbers of print version readers to decline even more. In Great Britain, for instance, the decline in numbers of printed newspapers was slow but painful. At their best, Britain's bestselling newspapers, the *Daily Mirror* and the *Daily Express* sold more than four million printed copies each. Today, the most popular edition sells 2.6 million copies. But even more worrying for newspaper subscribers is the increasing speed of the decline. The last year the decline of printed version newspapers in the United Kingdom varied between five and ten percent. For comparison, it must be noted that when the *Daily Mail* sells two million copies daily, its online version has over five million visits in the same time frame.[7]

The biggest problem newspapers are facing is that they cannot generate profits out of these online numbers that match those made in the print business. The income from the online version of the *Daily Mail*, for instance, was around sixteen million British pounds, whereas the revenue from the print business exceeded 600 million.

[7] For further information on the situation in British press please refer to: http://www.guardian.co.uk/media/2011/dec/25/ipad-kindle-newsresearchs-digital-print

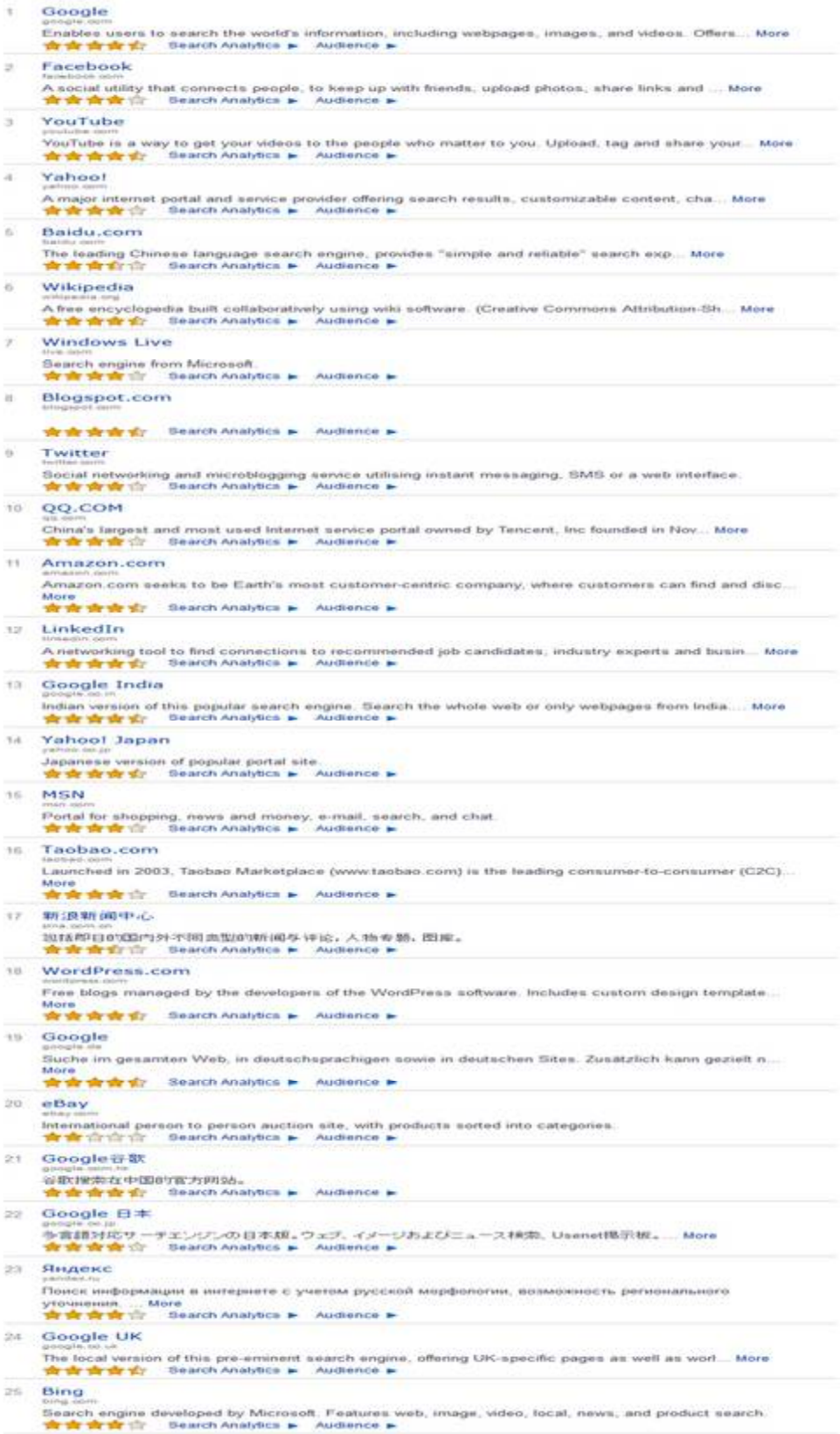
2.6.2 Information Distribution – A Not Open but Free Source?

It may sound paradoxical but despite the rapid rise of the Internet, many big companies did not manage to generate a reasonable profit out of it. With this we once again refer to the newspapers which, despite high numbers of online visitors, are failing in profit generation efforts. This, in my opinion, is due to the fact that at the beginning, the content newspapers were offering on their online platforms were as a rule free. As end of the 20th century the number of Internet users was very low, so this was not a big deal for newspapers. They simply wanted to display their tech-savvy and show an Internet presence like everybody else. Accordingly, online surfers were and are still used to the idea that news online is free. As a result of publishing houses and news companies' online engagement, their Internet content grew but the content still remained free. Many attempts to make such content accessible to the general public only after subscription failed. The experience showed that Internet users were willing to pay only for highly specific content available only on some particular websites. Consumer logic is understandable: if someone gives information, let us say, about an earthquake in the Asia Pacific region, and charges for it, we can go to hundreds of other sites which will be more than happy to freely offer similar content on their platforms.

More importantly, the Internet has caused a shift in the dominant players. In the past, professionally organized institutions produced the printed forms of newspapers, magazines, and books, and they dominated all aspects of content production; today the Internet providers have the lead. A look at the most popular web news websites (please refer to Graph 3) shows that there is no single professional news producing company in the list of the top twenty-five.

A closer look at the rankings indicate that the most popular pages are dominated by: 1. Search engines with google.com at the top and 2. Web platforms that allow people to produce personal pages. The examples here could be Facebook.com or Twitter.com.

But search engines and online platforms like Facebook.com do not neccessarily produce news. It could be argued that both facilitate news spread. Search engines aid in spreading news by indexing the news, and social networks or blogging sites do so by offering a space to share news links. However, some sites also place news produced by amateur journalists



Graph 3 Top Ranking Websites Worldwide[8]

[8] A screenshot of alexa.com ranking on 8.10.2011. For actual rankings please refer to: http://www.alexa.com/topsites

around the world. As an example of breaking news production on Twitter, one could use the cases of Arab revolutions in 2011 and the unsuccessful Iranian uprising against the falsification of the election results in 2008. Still, professional news production is something different and should be looked differently. The graph below shows the rankings of the most popular news delivery Internet platforms. The picture is intriguing. By taking a closer look we can see that here, old news producing institutions such as CNN, BBC and the *New York Times* are dominating the market. There are only two exceptions: the first is Google News which could be considered as a news aggregating platform (actually gathering the news from all other sources and delivering them to the reader in a compact form) and the second is digg.com which has a user generated news aggregating platform at its core.

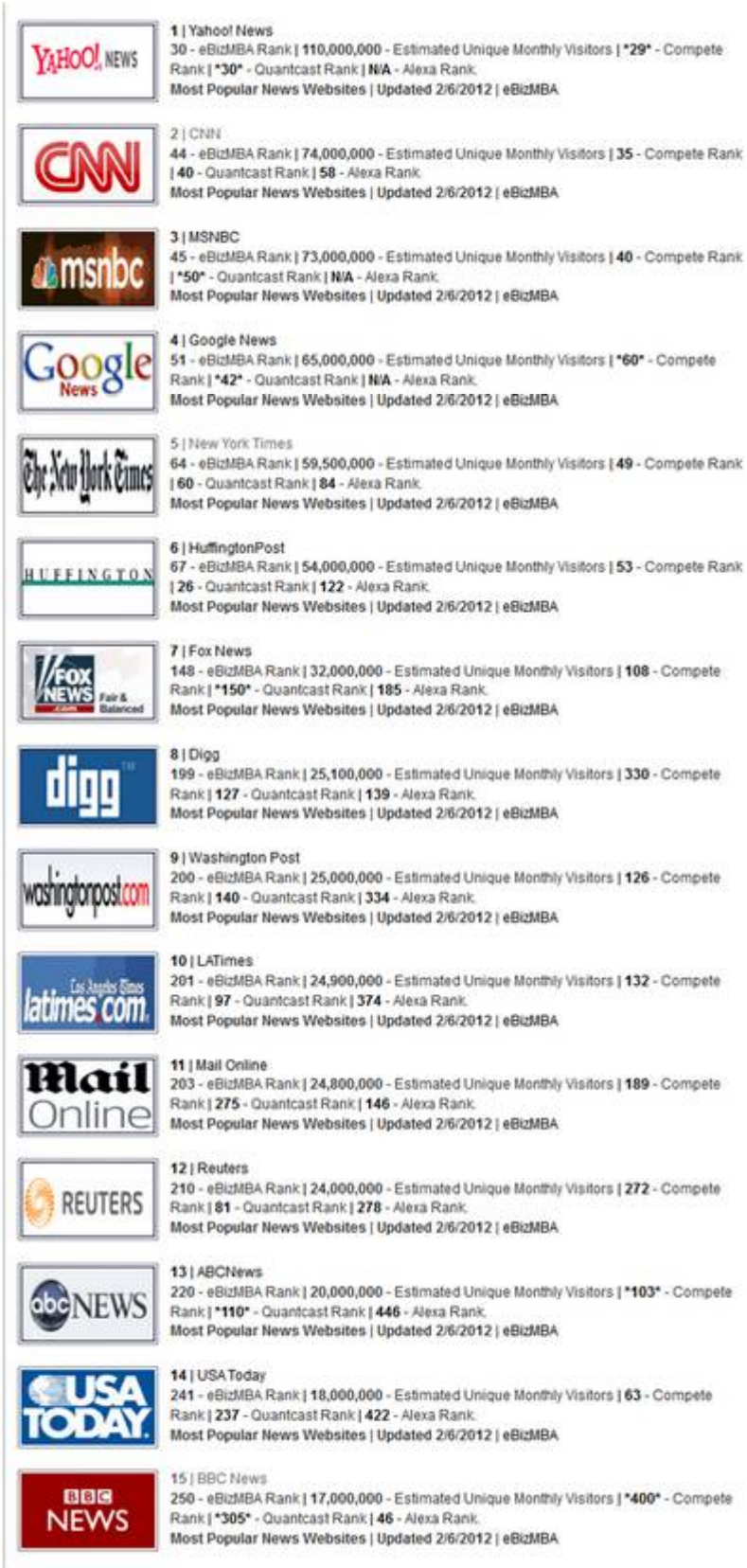
These rankings show that the domination of old, classical news producing companies has been breached by the Internet. On the top of the ranking list, we see Yahoo News, a news company which would have been taken seriously by analysts ten years ago.

Hence, we can state that the Internet definitely changes the landscape of the news market in general and threatens old business models. In content generation, a "normal Internet user" overtakes professional journalists (please refer the Alexa ranking once again), in professional news distribution, new companies such as google.com yahoo.com and digg.com are among the leaders, challenging the dominance of professional news producing companies. However, these companies still maintain significant influence over news delivery in cyber space, but they fail to generate the revenue which will help them overcome the financial crisis caused by the decreasing sales of printed newspapers. A vast majority of the online content offered by their online platforms remains freely available to all Internet users.

When information is freely available, there is only one option for revenue generation: advertisement placements and targeted ads. However, in this the global news producers have failed to take the lead. The global leaders in online advertisement are internet companies such as Google, DubleClick, Yahoo, MSN, AOL and Adbrite.[9]

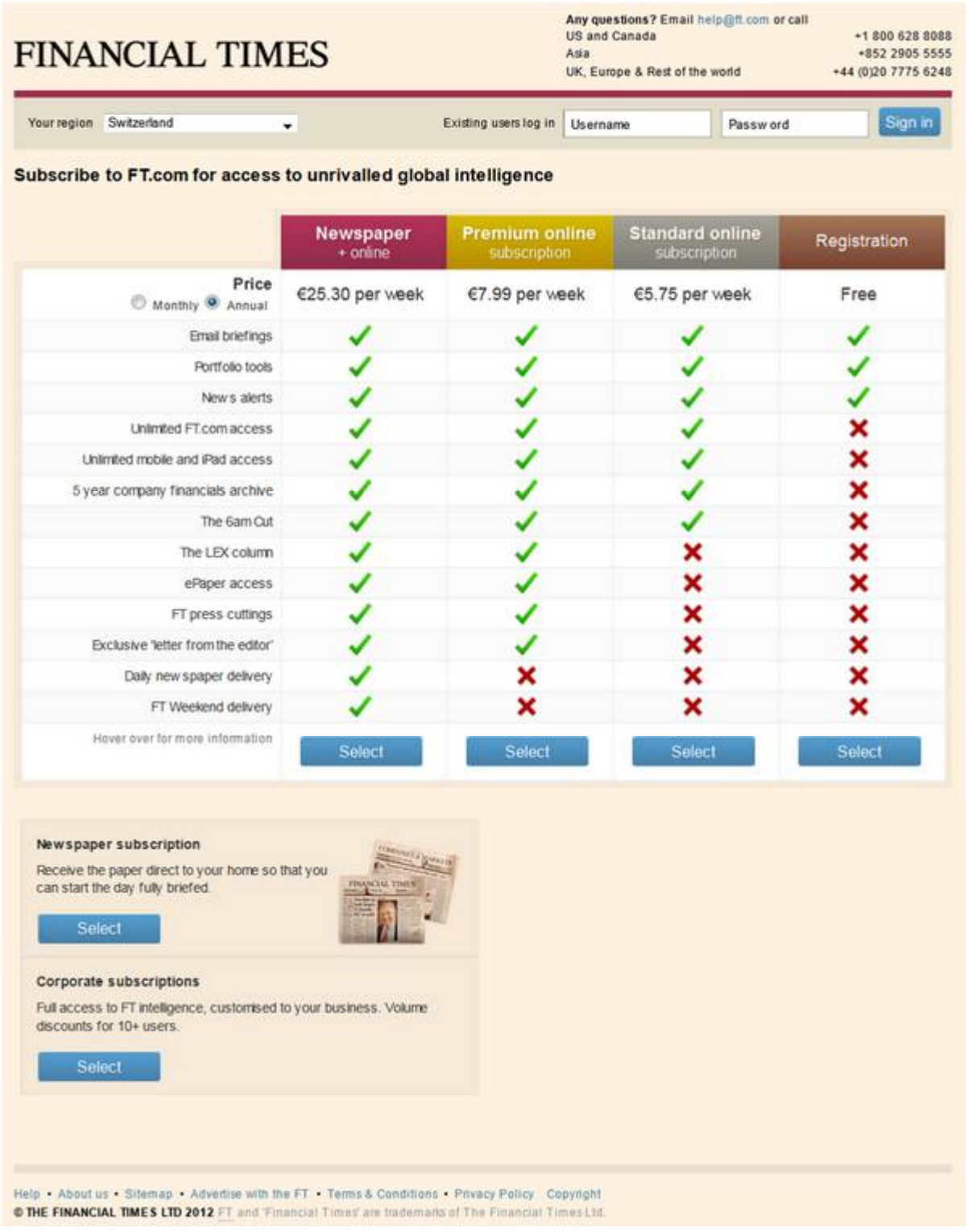
In such a situation, switching to a subscription model and risking the total loss of viewers is the only option for large news producing companies. The first widely known successful

[9] For the actual list please refer to: http://en.wikipedia.org/wiki/Online_advertising



Graph 4: 15 The most popular news producing websites worldwide[10]

[10] A screenshot of ebizmba.com on 8.10.2011. For actual rankings please refer to: http://www.ebizmba.com/articles/news-websites

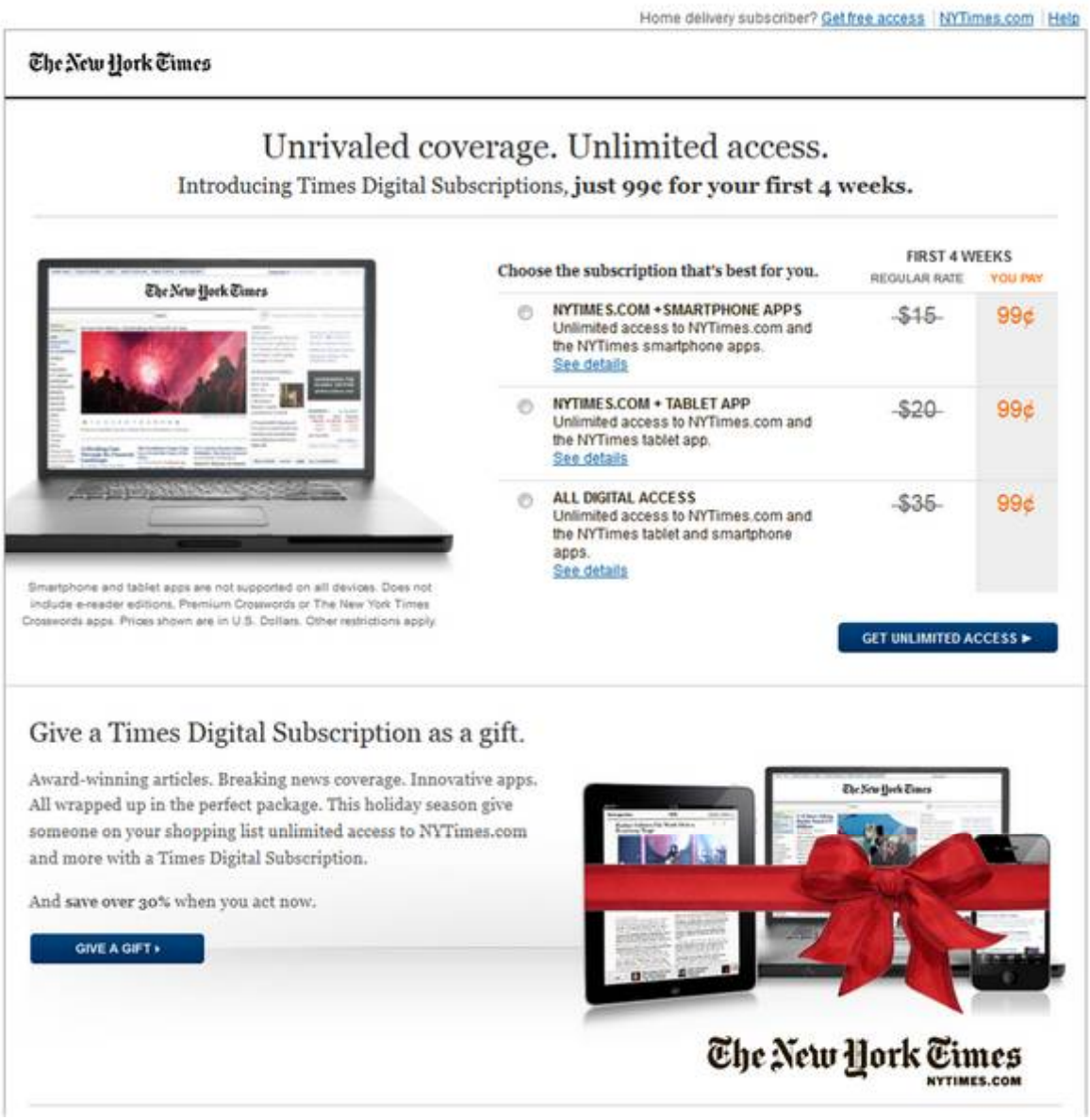


Graph 5: *Financial Times* Subscribtion Page

attempt to make Internet users buy online content was made by the *Financial Times*. The company has 260,000 online subscribers at the moment of this writing, whereas it maintains 337,000 print version buyers on daily basis. The sales of the printed product are twelve percent down on a year-to-year basis. For now, thirty percent of the entire revenue of *Financial Times* is generated by digital products, and company management is assured that

the digital income will overtake that of print version revenue in several years.[11] It is the same situation with digital subscriptions in nearly all the highly developed countries of the world.

Similar attempts at "commercializing" the online content was also made by the *New York Times* company, which is in the top fifteen news producing online platforms worldwide (see graph below). Whether these attempts will be successful is unclear.



Graph 6: New York Times Digital Subscription Advertisement

It is for certain that the vast majority of online content is user generated. The situation is different on the news generation side, where major Internet companies (with no user

[11] For more information please refer to: http://www.guardian.co.uk/media/2011/dec/25/ipad-kindle-newspapers-digital-print

generated content) and professional companies still dominate the market. However, besides of some isolated attempts to capitalize on this domination, Internet news remains freely available. Hypothetically, news production is not only free but also an open source as anyone can facilitate news production in many different ways. Social networks, blogging, and micro blogging pages provide excellent tools for amateur-friendly news production, but examples of user generated major news sources remain rare. This is understandable as it is very difficult to contend with large professional news production companies in news content production.

In the near future, we should expect greater and bolder attempts on the side of professional news producing companies in making their content available only to paid subscribers. However, these attempts will not change the situation in the short term, and most Internet news content will remain freely available.

2.6.3 Information Proceeding and Information Diffusion

Besides the information distribution forms discussed above, there is another method or channel of information distribution which was not yet considered in our research. This information distribution channel is highly specialized, and, as a rule, news from these sources is not directly and publicly available.

The information distribution channel we are speaking about is the channel under the control of the large news agencies which are, in most cases, the direct source of information (unlike Google News, which actually aggregates the information). The most important of them are the two “global players” on the market: Bloomberg and Thomson Reuters. Although not the largest wire agencies worldwide, these two companies are the largest service providers in what I call the third generation service of news delivery.

Common knowledge has it that both Bloomberg and Thomson Reuters are news or wire agencies which provide news to different media outlets. Additionally, Bloomberg and Thomson Reuters have their own direct distribution channels. In the case of Thomson Reuters, it is a website and in case of Bloomberg, it is a website, radio, and television

broadcasting channel with the same name. What is less known is that both companies offer data processing and data analysis tools to professionals.

Bloomberg runs this service under the name Bloomberg Terminal. Bloomberg Terminal is, generally speaking, a computer system which is designed to provide live access to all possible forms of raw data as well as data analysis tools collected by Bloomberg L.P. or by third parties. The number of users of this service is very limited, as access to the service is extremely expensive. Sources indicate that the prices of the service varies between 1500 and 2000 USD monthly. Bloomberg Terminal has around 300,000 subscribers worldwide. These are mostly institutional or individual subscribers from financial or other analytical organizations which need fast and direct access to data.

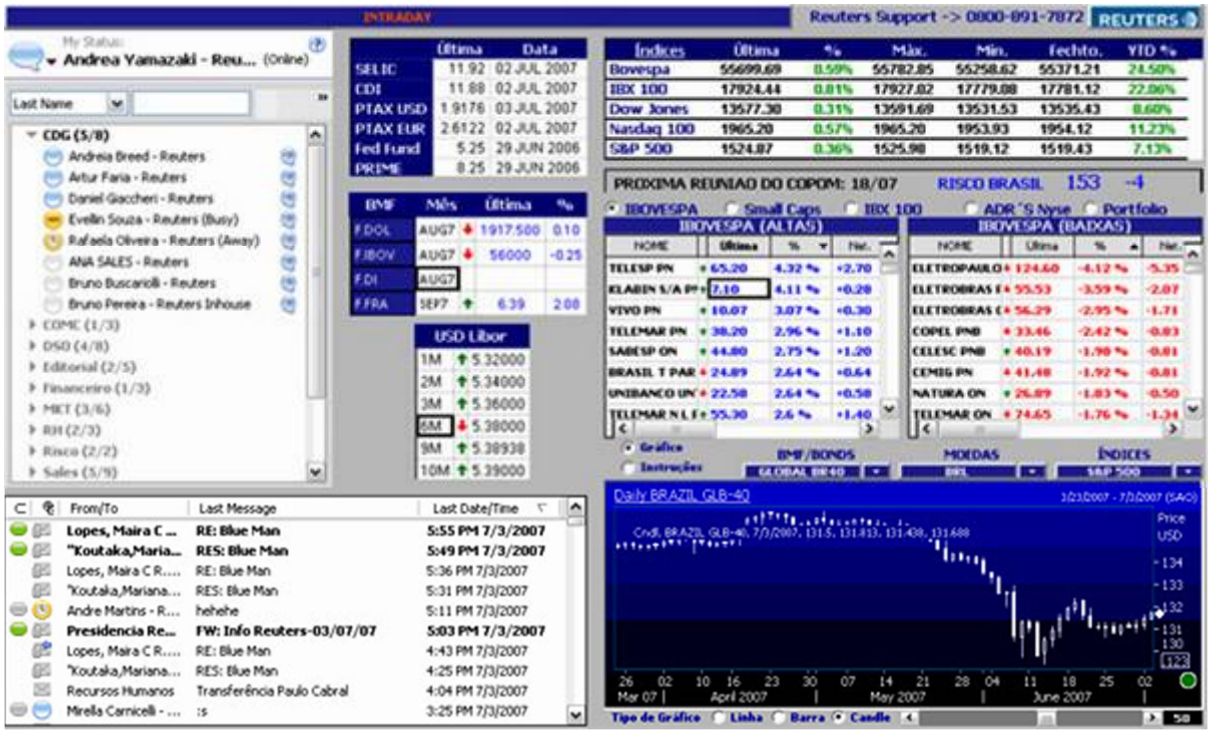
Graph 7: Bloomberg Terminal

A similar product, very much related to that of Bloomberg Terminal, is offered by the wire company Thomson Reuters. A product by the name of Reuters Xtra 3000 can be considered the direct counterpart of Bloomberg. However, unlike the Bloomberg product, the Thomson Reuters service cannot be considered a terminal which combines both soft and hardware. It is rather a software application which can be installed and used on any computer worldwide. But like Bloomberg, the service delivers to financial or other professionals different kinds of data, analysis, and tools. It can be said that both instruments have in common two very important things:

1. They deliver some kind of data or news directly to the user.
2. They deliver data immediately as it is available so that the user does not have to wait for some medium to filter the process, analyze, and publish the information.

Although there are other companies competing with Bloomberg and Thomson Reuters in the data processing business, these two companies are the only major players in this market at this time.

The two features, which are common for both service providers, cannot be found in the first and second generation media companies.



Graph 8: Thomson Reuters XTRA 3000

We are now dealing with new forms of information distribution which were unseen until the introduction of such fast and powerful news processing tools. Third generation news products give users immediate access to information and data which can be proceeded for decision making purposes, and the amount of such information and data is theoretically limitless. The only limit consumers face during the information processing and decision

making process is the limited ability of human beings to deal which such a large amount of information at one time. Data and information processing and diffusion speed is so high that no human being can cope with it. Therefore, I argue that with these third generation news processing tools, we face new challenges in our modern world for which new solutions, that is, new ways of news processing should be found.

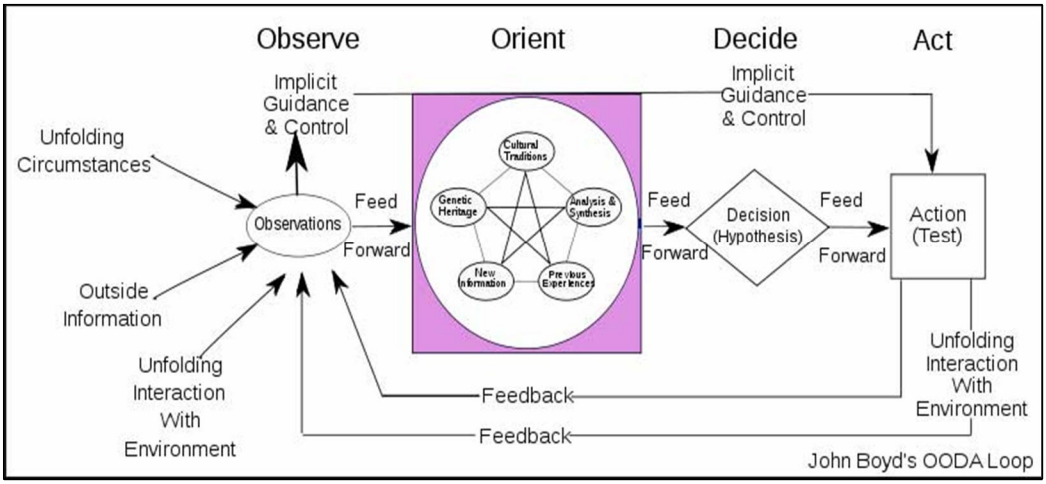
2.6.4 Speed of Distribution in Science

The last problem we will address in this study, it the problem of speed of information delivery or as I name it the problem of speed of information diffusion. In order to make this problem clear, the present work will make, for many, surprising turn and devote its attention to the concept of speed in military strategy. And we will start this tour with John Boyd's concept of OODA loop.

In the mid-1950s, John Boyd, Colonel in the U.S. Air Force, developed the OODA Loop as a way to describe the cognitive processes he used during air combat in the Korean War. The steps are Observe, Orient, Decide, and Act; then, as indicated by the word "loop," cognition returns to observation. His analysis of dogfights showed that time was crucial; in order to win, a pilot must quickly assess a situation and respond appropriately. The side that went through the loop faster had a clear advantage in combat – Boyd called it "getting inside" the enemy's loop (Bryant, 2006, p. 185). This could be accomplished by many hours of experience which would lead to implicit rather than explicit decision making. In effect, a winner would not *consciously* make any decisions at all! (C. Richards, 2008, pp. 1-69).

Offensively, the concepts of fog and friction described by Clausewitz can be manipulated to reduce the enemy's tempo (Schechtman, 1996, p. 34). Friction is defined by Clausewitz as the unexpected problems that limit performance in the real world, such that it is never as perfect as planned. An example of friction would be interference (whether from sunspots, deliberate action, or other cause) in the opponent's ability to communicate in near real-time using satellite linkages. Fog is defined as uncertainty, e.g. incomplete and/or contradictory information (Schechtman, 1996, p. 34). In addition to increasing fog and friction for the enemy, one seeks to decrease fog and friction for one's own side.

Bryant (2006, p. 186) points out that Boyd himself never applied the OODA Loop to any context besides air-to-air combat; however, military strategists as well as researchers in other cognitive contexts have used the loop to explain decision-making. The OODA Loop has been used to guide practices in learning theory, business knowledge management, data fusion, artificial intelligence, and social sciences. Some researchers have taken the loop as-is (C. Richards, 2008), while others made modifications to it (Bryant, 2006, p. 190; Hexmoor, McLaughlan, & Tuli, 2009, p. 65).



Graph 9: John Boyd`s OODA Loop

The first step in Boyd's Loop is Observation. Before any analysis or decisions can be made, a decision maker (DM) must gather information. Knowledge may come from a variety of sources including past learning, sensory data, technology, other individuals or groups of people (El Sawy & Majchrzak, 2004, p. 25). Sometimes the amount of information is so extensive that preprocessing must be done, typically by machines. Situation understanding (SU) can be increased by "(1) machine-level data preprocessing to output estimation, (2) user-level defined sensor queries to display metrics, and (3) system-level operational design to afford diplomatic coordination." (Blasch et al., 2009) Thus, the Observation step involves much more than just "looking around." Multiple levels are considered, as well as the interactions between levels.

The most important part of the Loop, according to Boyd, is the Orient step (Wilson, Wilcox, & Richards, 2004). Wilson et al (2004) calls it the "fulcrum" of the OODA Loop. In this step, knowledge received through observation is prioritized, correlated, interpreted, and cross-referenced. An individual filters basic perception in order to determine what is important

and what an isolated fact might mean in the larger domain. Filters are created by prior learning, which may be deductive or inductive, and may result in true or false assumptions – even some that are partially true. Thus, filters can present a problem when, for example, they are based upon incomplete or false information (e.g., stereotypes)(Azuma, Daily, & Furmanski, 2005). Cultural traditions also play a large part in the Orient step (Blasch, et al., 2009). Although the term 'culture' usually relates to race or ethnicity, in this context culture refers to the shared values, ideas, concepts, and goals found in an organization or a group. Each member of the group has a model of the culture within his/her mind that is more or less congruent with the cognitive models of other group members. Thus, group members tend to agree on their interpretation of events during the Orient step (Blasch, et al., 2009).

The Decide step involves choosing a path based on the knowledge gained from the Observation and Orientation steps in the Loop. Decisions are constrained when the individual is unable to generate sufficient alternative courses of action. When only one or two possibilities are named, it is easier to choose but the choice may not be the best one. On the other hand, when too many alternatives are considered, a person may find it so difficult to choose that he/she falls into "analysis paralysis." (Ullman, 2006) Decision making can be even harder when a team rather than an individual is involved. Team members must have a method of managing uncertainty so that a consensus of orientation leading to decision making can be implemented (C. Richards, 2008; Ullman, 2006).

Finally, the last step of the OODA Loop is Action. At this point, the decision based on observation and orientation is carried out. Ideally, action occurs intuitively and with "superb competence" (C. Richards, 2008). Once the action has been taken, the simple form of the OODA Loop leads the individual back to the beginning for observation of results. If the action is successful, of course, there may be no need for further observation. However, many tasks are complex and require several iterations of the Loop (Brehmer, 2007).

The Loop in its simplest form, as described above, is inadequate for most applications because it is "sequential, slow, easy to disrupt, and quality and quickness trade off" (C. Richards, 2008). However, Boyd later presented the OODA Loop in a more complex form. The first step, Observation, was explicitly linked with circumstances and interaction with the environment as it occurred in real time, and combined with outside information to

feedforward the best collection of data into the Orientation step. Boyd noted the importance of cultural traditions, genetic heritage, new information, previous experience, and analyses/syntheses in discovering the meaning of the collected data. The Decision step was associated with a hypothesis which was tested in the Action step. All steps were linked by feedback and "implicit guidance and control" which clearly indicated a nonlinear OODA Loop (C. Richards, 2008). However, as indicated by evaluations of the OODA Loop below, most researchers have concentrated on the shortcomings of the simple Loop rather than the benefits of the more complex form.

Grant & Kooter (2005) evaluated the usefulness of the OODA Loop in the context of Command and Control (C2), as compared with 5 other operational C2 models. They found that OODA lacks many important aspects of C2, so it is best understood as a partial presentation that focuses on decision cycles of individuals. OODA does not explicitly discuss the opponent, is not directly applicable to teams, and lacks psychological concepts such as attention and memory. OODA also fails to address learning processes, planning, and imperfections of the real world. However, the authors (Grant & Kooter, 2005) noted that none of the other C2 models were complete either; all focused on one aspect to the exclusion of other, made inappropriate assumptions, etc. They suggested that modifications of the OODA Loop would be effective in some settings, while others would required more extensive changes. Interpolation of the OODA Loop with Situation Awareness ("big picture") and natural decision making (NDM) would be especially helpful (Grant & Kooter, 2005).

Bryant (2006, p. 189) describes a modified OODA Loop based on modern models of human thinking, including goal-directed cognition, constructivist theories, mental models, and critical thinking. He focuses attention upon two constructs: the conceptual model, or planned operation (what do you want to achieve?), and the situation model, or actual state of the battlespace (what is happening right now?). These constructs allow an individual to compare and contrast plans with reality, then make changes in the plans so they will better reflect the real battlespace. If these changes are not made, plans will continue to diverge from reality until they have little if any meaning left.

Bryant calls his loop CECA: Critique-Explore-Compare-Adapt. In the Critique step, information needs are identified. Current understanding of human cognition suggests that

thinking is directed by goals; thus, the "observation" in the OODA Loop is not merely a bottom-up sensory process, as Boyd seems to say, but a combination of top-down choices and bottom-up data (Bryant, 2006, p. 187). The required information is gathered in the Explore step (one of the advantages of this model is it provides a way to avoid information overload by prioritizing the information that is most needed), and compared to the conceptual model in the next step (Compare). Finally, the conceptual model is adapted to reflect any discrepancies between it and the situation model. It is important to realize that the CECA loop is not linear, as all the steps interact with all the others.

Bryant points out that linearity (assumed by the OODA loop) is uncommon in reality, especially in the chaos of war (2006, p. 194). The CECA loop does not explicitly include action (Bryant, 2006, p. 195), but action is implicitly a continuous process that is guided by the conceptual model. CECA occurs in parallel to action and is used to assess the effects produced by actions on both sides of the war.

An important factor in Bryant's modified loop (2006, pp. 183-216) is the necessity of sharing the conceptual model with other parts of the organization. He points out that "the shared conceptual model is not meant to be a huge document explaining every detail of the operational plan." Instead, an overall concept must be developed based on shared values and purposes so that all members of the organization can apply the model to their own roles (Bryant, 2006, p. 194).

Brehmer (2005) presented a research at the 10th International Command and Control Research and Technology Symposium, held in McLean, VA, which combines Boyd's OODA Loop with principles of cybernetics to describe a model of C2 that is more comprehensive and detailed than either of the 2 approaches. Cybernetic approaches to C2 determine the required functions of command and control, then seek processes that can meet those functions. Brehmer's Dynamic Decision Cycle (2005) is a cybernetic approach with 4 steps (information-decision-action-result) that feed back so that there is no explicit goal (just like the OODA Loop). He combines the DDC with the OODA to produce a Dynamic OODA Loop (Brehmer, 2005). Because it focuses on functions, it is more general than other models. These functions are gathering info, processing info, assessing situations, listing objectives & means of achieving them, deciding, planning, writing/transmitting/verifying orders, and

monitoring actions. Depending on the results seen in the latter function, the loop may continue or, if the objective has been attained, it may stop (Brehmer, 2007).

Hexmoor et al explore the best roles for humans and machines in decision making (2009, pp. 59-77), contrasting MITL (man in the loop) with MOTL (man on the loop). The MITL role implies direct involvement by human beings in all levels of supervision – data, information, knowledge, and wisdom (from bottom to top) – while the authors' MOTL alternative allows for indirect human control in the data and information levels, which can be handled by automation. Thus, humans can devoted most of their attention to the higher levels which required greater cognitive skill. Decision making is still the province of people, but machine "agents", guided by human supervisors, carry out the tedious tasks.

The MOTL paradigm is carried further by assigning desirable attributes to the agents that interact with people in the four levels of supervision. Personality traits include conformity, sociability, commitment, and disposition. Since these traits are rarely applied to machines, it is necessary to provide a slightly different definition for each trait. In this context, conformity refers to "how quickly and exactly an agent responds" to orders, whether from a higher agent or a human. Sociability refers to the agent's behavior with other agents. Commitment is a percentage that measures how strongly a goal is pursued, while disposition indicates how quickly an agent becomes frustrated (Hexmoor, et al., 2009, pp. 62-63).

Cultural parameters in the MOTL model include power distance index, individualism, uncertainty avoidance index, and long-term orientation. Successful automation typically requires high power distance index and uncertainty avoidance index, along with low individualism (a corollary of conformity). However, there can be other cultural requirements depending on the domain (Hexmoor, et al., 2009, pp. 63-64).

Finally, social reasoning (Hexmoor, et al., 2009, pp. 64-66) involves grouping, capability, social power, and interdependence. Interdependence is absolutely required for functional automation, since it is connected to trust and autonomy. Successful multi-agent systems have interdependent and trustworthy relationships. If an agent moves too far in the direction of independence or of dependence, the functionality of the automation will be compromised (Hexmoor, et al., 2009, p. 65).

Schechtman (1996, pp. 1-116) examines the OODA Loop as a model of information warfare in the context of an information processing system (IPS). The IPS-OODA decision loop affects the "electronic battlefield," a virtual representation of military action. The IPS is most important in the Observe and Orient steps; information is filtered twice, first when it is entered into the system – not all data can be included, so the system will prioritize data that was considered important in the past – and again when information is requested, because the requester must know the correct question to ask (a non-military example of this problem is the difficulty presented by early Internet search engines that did not yet "know" what people were going to ask). The second filter can result in too little relevant information and too much irrelevant information, especially when a line of inquiry is introduced that the IPS has not encountered in the past (Schechtman, 1996, pp. 51-53).

The first filter can be handled by increasing the percentage of data entered into the system, but at some point (different for each IPS) additional data becomes counterproductive because the system cannot effectively condense it for use in the Orient step. Collection filters can extract a subset of data so that both the total amount of data and the percentage of data that is pertinent are increased (Schechtman, 1996, p. 54). Feedback is given whenever a user interacts with the system (analogous to the way Google results change over time) and the IPS is constructed incrementally in the context of the Observe and Orient steps of OODA.

The OODA Loop has been applied to communications, social network analysis, first responder readiness training and real-time knowledge management in business, as well as other domains (Bell & Cox, 2006; Dekker; Shahbazian, Blodgett, & Labbe; von Lubitz, Carrasco, Levine, & Richir, 2004). Bell & Cox (2006, pp. 1-45) examine the breakdown of communications that often occurs during a natural disaster or other catastrophe such as a terrorist attack. They found 3 major blockages that become prominent when need for communication is heightened: 1) information locked into individual emergency services comm systems, 2) information flow with too much reliance on direct linkages and too little redundancy, and 3) lack of real-time information about conditions in the disaster area, since most disasters happen in environments that don't normally require real-time information.

Using the C2 (Command and Control) context, the authors explore the OODA Loop process in the 3 domains of physical, information, and cognitive. In the physical domain or operating environment, incident monitoring and synchronization of action are crucial. The information domain carries incident monitoring up to the cognitive level and sends information on incident management down to the physical level. In the cognitive domain, awareness, understanding, sense making, and intent are the processes that form a bridge between incident monitoring (input) and incident management (output) (Bell & Cox, 2006, p. 14).

It is imperative for data from different sources and in different forms to be coalesced and distilled into a format that can be understood by most if not all of the first responder community. This occurs in the information domain as a part of incident monitoring leading to the cognitive domain. In a sense, the information domain task on the other side (cognitive to physical) is analogous, in that the overall plan is separated into goals or missions, one or more for each smaller unit in the physical domain. Bell & Cox (2006, pp. 16-17) suggest that a fully networked emergency response system will speed movement through the OODA Loop, since decision making is distributed, feedback is almost instantaneous, and virtual meetings allow experts in various fields to quickly convene for problem solving (Bell & Cox, 2006, pp. 16-18)

In Social Network Analysis, mathematics is used to help describe relationships between people and/or groups. This branch of social psychology examines the many roles an individual may play in a hierarchical organization, including both formal and informal roles (Dekker, 2001). Social Network Analysis strives to visualize relationships, describe interactions between relationships, and determine the implications of the relationships. This information, when combined with data regarding functionality of the OODA Loop in a given organization, can lead to improvements in communications flow and decision making. Dekker (2001) developed a tool called CAVALIER (ChAnge VisuALIsation for the EnteRprise) that partially automates the process of Social Network Analysis. Using this tool, he was able to find areas in social networks that caused blockage in one or more steps of the OODA Loop, e.g., two individuals who observed overlapping sections of a data source, but did not communicate and co-orient their observations. In this instance, data reached the higher levels of the hierarchy in an un-oriented state, slowing down the Loop (Dekker).

Readiness training for medical first responders in non-combat contexts was evaluated by von Lubitz et al (2004) using the OODA Loop framework as a guide for determining success of training. They discovered that the normal forms of training, which were physical and scripted, resulted in Loop blockages, particularly in the Decision step. The authors surmised that a more flexible type of training would allow first responders to acquire better skills that would allow quicker movement through the Loop. The Synthetic Distributed Readiness Training Environment, which uses virtual reality, patient simulation, and other technologies to present unscripted, variable situations, decreased time going through the Loop and increased communications and synchronization of the various first responder units (von Lubitz, et al., 2004).

El Sawy & Majchrzak (2004, pp. 21-38) discuss applications of the OODA Loop to real-time knowledge management (RT-KM) in businesses. They identified six areas in which RT-KM could be improved in order to speed movement through the Loop: 1) information quality, 2) managerial attention, 3) adapting core processes to RT-KM, 4) integrating unpredictable perspectives, 5) developing heuristics that emerge in real-time, and 6) capturing actions and learning to be used later. Information quality is essential; it is unlikely to reach a correct decision based on incorrect data. In order to bring new data to the attention of managers as quickly as possible, information access and exchange must be refreshed in near real-time. When an “unknowable” (a piece of unexpected data) comes in, immediate action is required (El Sawy & Majchrzak, 2004, p. 28). Vigilant information systems can serve as intake agents for the data, then pass it quickly to decision makers. Studies in RT-KM have noted that adaptive learning mechanisms are better than expert systems since they are dealing with emergent work processes. Virtual workspaces allow cross-connections between agents (human or machine) and can easily capture the results of information processing for future learning. The optimization of these 6 areas is necessary to quicken the pace of the OODA Loop, ideally into real-time (El Sawy & Majchrzak, 2004, p. 35).

In 1996 researchers constructed a war game and paired Marines with futures traders to determine how traders used the OODA Loop and, in turn, how they could inform the best practices of the Marines (West, 1996). The traders used a modified Loop with the following steps: Information, Sort by priority, Act, and Assess. The ISAA maps to OODA with IS equivalent to OO, no explicit Decide step, and the addition of an explicit assessment step.

The traders used quantitative tools to search and sort incoming data, and accessed multiple data sources. Graphics displays (charts of various types) were especially important. They rarely experienced information overload; on the contrary, traders expressed the belief "you can't have too much information." They looked for patterns in real-time (Information step) and tested the market with small positions (Act) to determine if their hypotheses about the direction of futures trades were accurate (Assess). These practices were then re-mapped onto the military OODA Loop to describe better tools to analyze data, the implicit nature of the Decide step (at least in theory), and the importance of explicit feedback to assess results (West, 1996).

Although the OODA Loop as first described by John Boyd is a simple, linear process, its newer incarnations have grown increasingly sensitive and detailed in their ability to describe actual cognitive functioning in decision making processes of all kinds. The basic OODA concept has been extended to include overlapping, nonlinear processes that have both feedforward and feedback connections. Also, OODA has been incorporated in models of decision making, organization, C2, and information management that examine the "big picture" in a general way that is applicable to many disciplines.

This literature review has emphasized military applications of the OODA Loop for two reasons: one, the Loop was originally developed in a military context, and two, at least 75% of the extant literature is related to warfare. However, applications to first responder readiness training, communications, futures trading and social network analysis have also been discussed.

It is clear from the myriad expansions of OODA that, by itself, it is too simple and straightforward to suffice for any but the smallest decisions. There is also evidence that even in small contexts it falls short of describing actual cognitive processes, since it omits important factors in cognition such as attention and memory. It can be useful, though, as a "jumping-off" point for understanding cognition, as long as its limitations are remembered.

As we saw in above review, there are many modifications and adaptations of the presented concept. I firmly believe that the concept of OODA loop is also of utmost importance for mass communication research. As observed, in the concept of OODA loop, those are advantageous who hold the information first and act upon it in fastest possible and correct

way. Holding and acting upon the information is a major point of interest not only for the military strategy but also for mass communication science. This turns to the problem for free media and society with the increasing mediatisation of the last. High state of mediatisation implies also the problematic of news diffusion speed. Modern technologies enable us to be in possession of some breaking news within the second even millisecond (this is mostly true for financial markets) after the newsworthy occurrence has actually happened. Those lucky enough to have this information faster than other possess tremendous advantage over the rest of us. Having this advantage could be dangerous for the social structure under certain circumstances. I will not speak about these dangers and possibilities at this point. The issue of information diffusion speed will be addressed separately in third part of this thesis.

Here, it is important to note that the seven problems of the media and society should be see through the lens of mediatisation. As the mediatisation phenomenon becomes even more evident in our globalized society, the bigger will be the danger coming out of all the seven fundamental problems listed in this part of the dissertation when leaving them unattended.

As we already saw above, there has been tremendous work done in studying the issues related to six fundamental problems. The main focus of the present study, thus, should be seventh problem of information diffusion speed, its effects and consequences.

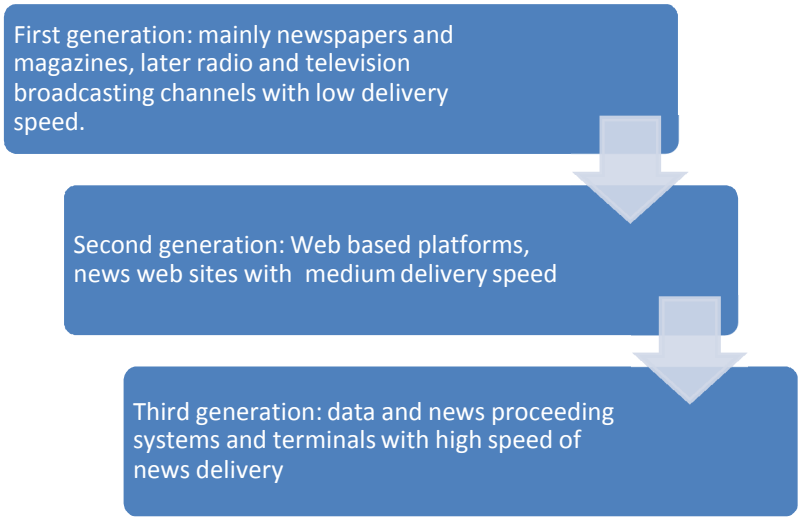
2.6.5 Developing an Information Diffusion Loop

Based on my argumentations in the above chapter, I differentiate three generations of news delivery systems which, at their introduction and developmental stages were all revolutionary.

The first such revolution happened around 1450 - 1455 AD when Johannes Guttenberg introduced a novel method of book replication. Since that time, citizens of Europe and later of the entire world could increasingly rely on the news coming from printed outlets such as books, newspapers, and magazines. It took centuries before the art of printing would reach its peak. With the implementation of better printing methodologies and the development of various mechanical means of news distribution, the speed of news distribution increased

significantly over time. The introduction of the telegraph, the radio and later television has increased the speed of information delivered to unheard of highs.

One might argue that the introduction of the telegraph, radio, and television should be seen as revolutionary and put as the second, third, and fourth generation means of news delivery, but in my opinion the ground-breaking occurrence in this perspective was the introduction of the Internet. It not only technically increased the speed of the document but substantially changed the way news was delivered to the end user. First generation news delivery systems were characterized by certain forms of filters on the way of news was getting to the user. In this way, we always had not only the technical medium but also the human filter which was selecting, filtering, analyzing, framing or commenting and bringing the news to us. In the case of newspapers, the highest speed of news delivery varied and continues to vary between two and four hours, whereas a delay in news delivery between six and eight hours not uncommon. The availability of the telegraph to the general public was always out of the question. Access to this means of communication for "normal" users was extremely difficult. Hence, at the start and end of the wire service, there were professional news producers and correspondents. Most of the telegraphed news was still delivered to the end user via the common means of mass communication such as newspapers or radio. Also, television and radio are still mediums which still need considerable time to deliver news to the end user. This is due to technical issues and also due to the fact that journalistic filters, as well as classical models of organization management, remain in force.



Graph 10: Three Generations of Information Delivery Systems

To systematize, I argue that first generation of news delivery methods have following the characteristics in common:

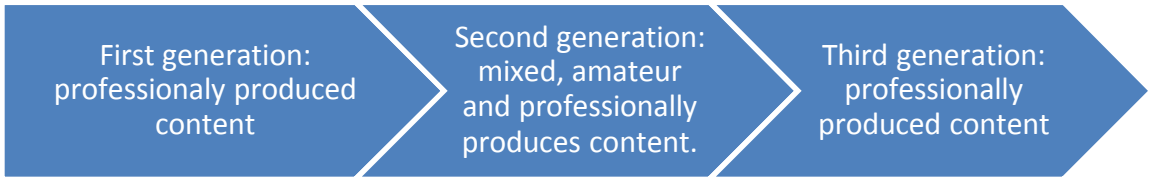
1. Delay in news delivery from up to eight hours (newspapers, magazines) to several minutes (radio, television).
2. Limited amount of news delivered.
3. Communication model: one to many.
4. Classical, that is, institutionalized business models where the news production, selection, framing, and filtering are solely in hand of professionals.
5. High costs of news production.
6. High cost of the available information for end users.

The introduction of Internet has completely changed the way news is delivered to the end user. This was the first time, when, theoretically, news could be delivered to the reader within seconds. Beside this, the main characteristic of second generation of news delivery methods were twofold: 1. classical models of news distribution, which was one to many, was removed. Now, many could communicate and communication could be two-sided. That is, a news reporter could turn to the end user and the end user to the news reporter in the shortest possible times. 2. Many filters which were standing between some newsworthy occurrences and the end user in technical terms were removed. The content production (as shown in the ranking graphics above) is in the hands of web users, and one does not need to have any specific training in communication or mass communication to become a content producer. Hence, we have the following characteristics of second generation news delivery:

1. Delay in news delivery from several minutes to several seconds.
2. Unlimited amount of user generated content.
3. Communication model.
    a. one to many
    b. many to one
    c. one to one
4. Complete flexibility of business models development for news delivery purposes.
5. Significant reduction of filters between newsworthy occurrences and end users.
6. The ability to change reporter–end user role in the shortest possible time.

7. Shift of content production from media professionals to general users.
8. Low costs of news production as everybody is a potential reporter.
9. Low cost of information for the end user.

Third generation news delivery could be considered the resurgence of professionals on the news and data processing market. On this stage, news production and delivery is even more strongly controlled by the news media than was the case in the first generation news production era. Unlike the second stage, for amateurs, it is extremely difficult when not impossible to control the market. Also, end users are very wealthy institutions or individuals.



Graph 11: Control over News Delivery in Different Generations

Although in the third generation the news delivery speed has increased even further, the scope of users to which this news is delivered has narrowed dramatically. Only a wealthy few have the privilege to access information available through these information delivery channels. Here, as we face the problem of handling huge amounts of data processing, new communication models are emerging which were unseen before in this form and quantity:

- One to system: where information send by the reporter source is not received by a human but by some content analysis system or algorithm.
- System to one: where information is generated by the system and is delivered to the end user without any human interference.
- System to system: where in news or data production and receiving, no human is involved.

Hence third generation news delivery has the following characteristics:

1. News delivery within milliseconds
2. Unlimited amounts of data and news delivered

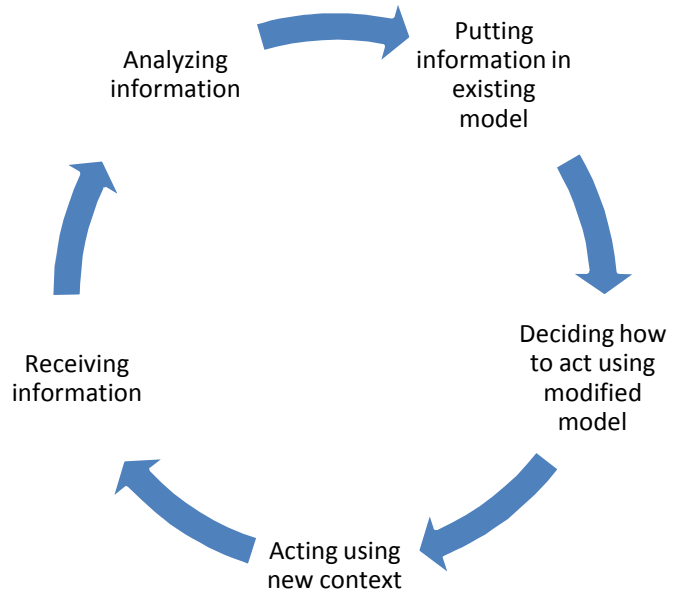
3. Communication model:
    a. One to many
    b. System to many
    c. System to system
    d. One to system.
4. Highly institutionalized business model.
5. Absolute disappearance or complete reduction of filter between the occurrence and the end user (end user is the filter approach).
6. Ruthless role division between the information source and the end user (the absence of two way communication).
7. Content production in the hands of media professionals or news generating algorithms.
8. Medium costs of information production.
9. High cost of information consumption for end user.

It must be noted that all three generations of the news delivery systems are intact and the vast majority of us are frequent consumers of first and second generation news delivery systems. The consumption of third generation news delivery systems is limited to only very wealthy institutions and individuals. The highest advantage the third generation news delivery systems are creating for their consumers is the speed of news diffusion. Here, we clearly face the problem of news diffusion asymmetry. My research shows that news delivered to third generation news delivery system users is available to the second generation customers with a delay of between twenty-five or forty minutes whereas first generation news delivery system users receive similar news between a thirty-minute and a twenty-four hour delay, depending on the channel they are using.

News diffusion asymmetry is creating advantages for select consumers, which poses potential problems for society. A person who is informed faster can act faster. Therefore, we have to ask what is the use of information when we have no ability to act upon it?

Based on the OODA loop presented in the above chapters of this research, I argue that the primary use of any news is its integration in the decision making process. Without information (that is without data) to proceed, we cannot create a surrounding picture and,

hence, we cannot act. Using this argument, I introduce a model of the decision making process which is, admittedly, a modification of the OODA loop. I believe that all information consumers process information using something like this model.



Graph 12: Information Diffusion Loop

The presented information diffusion model has five key characteristics. I suggest we look at these characteristics point by point.

Receiving information: This is a crucial step in the model. As noted, without information we cannot act. Accordingly, the first step in the model is the simple but powerful act of information delivery or reception which enables all the further steps in the process.

Analyzing information: understanding of the received information, that is, understanding of its content is the second step in the model. To put it simply, we first need to understand the content of received information, or as some would say, we need to decode it, in order to be able to act upon it.

Putting information into the existing model: we always have some decision making model. We never act upon one piece of information. We always put information into some complex model according to which we analyze all the surroundings and make decisions. These models are highly complex and differ from person to person. The formation of such models depends

on many different aspects of life, such as our education, ethnic background, personal experiences etc. I argue that information is always put into some sort of existing model through which we understand the world.

Deciding how to act using modified model: After information is received, understood, and put into context, one can decide how to act upon it.

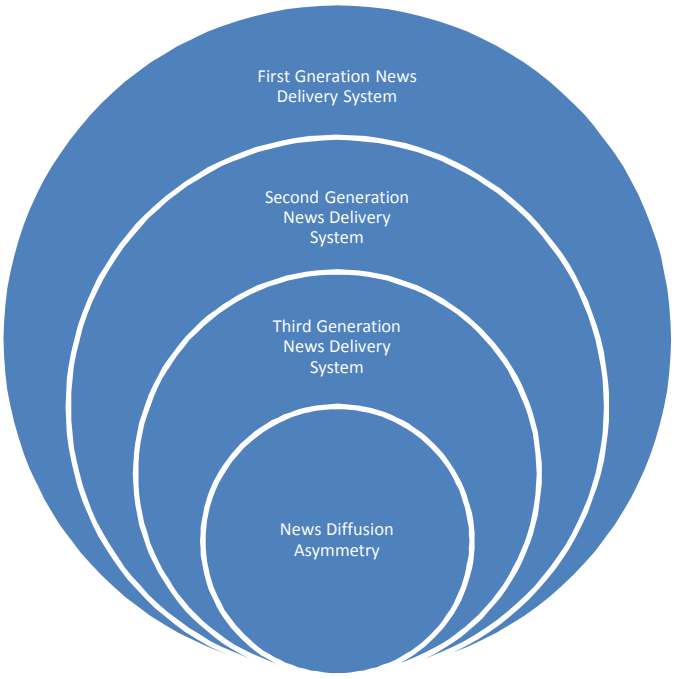
Acting using new context: this is the concrete action steps with which we have some particular impact on the surrounding world and receive a corresponding response.

As the name loop indicates, I consider this process to be constantly repeating itself, and hence it is uninterrupted, given that one constantly receives new input in the form of constantly updated information. I argue that a successful decision making process which goes through this presented information diffusion loop depends on two major aspects: 1. The speed at which the above loop is completed and 2. the quality of the information based upon which the loop is completed. I consider both aspects to be of the utmost importance. While we will dealt with the second aspect theoretically in an earlier part this report, we will engage in empirical research to investigate first aspect, the speed of information delivery, as the scope of this research does not allow anything further.

The empirical research will attempt to show whether the news diffusion asymmetry hypothesis will hold when subjected to reasonable statistical tests.

I believe that news diffusion asymmetry is a problem which accompanies the mediatization phenomenon and becomes increasingly noticeable with an increasing state of mediatization in global society. Individuals always have strived and will continue to strive to create advantages for their own purposes. The introduction of second generation news delivery systems has threatened the dominant role of the elites in information processings. At the same time, it changed the ways information could be processed by actually increasing the data stream to such a level that no human could comprehend it. New ways of news processing were necessary for information analysis. Third generation news delivery systems partially addressed and solved the issue. Data delivery time has decreased to a millisecond. Information is delivered only to a select few. This select few can use the information to its advantage. However, by introducing solutions to one problem, the third generation data

delivery system created another: the amount of delivered data leads to information overload.



Graph 13: News Diffusion Asymmetry - Visualizing Model

The methodological part of this research will address this above problem of data overload and offer some solutions based upon the empirical research of this study. Later, I will address the problem of news diffusion asymmetry and try to provide some solutions for it in the concluding chapter.

3. Methodology – Modern Challenges of Data Flow and Analysis

Chapter 3 of the thesis describes the methodology used for conducting the empirical research. This chapter introduces the method of quantitative content analysis, as well as describes a methodology for what I call a new method of news processing. The second part is dedicated to the statistical analysis of the method utilized. The method is commonly referred to as Granger causality analysis and is designed to identify semi-causal relationships between two variables. Alongside with the pure mathematical model, I provide a common sense explanation of the used method so that also reader not very well versed in statistical models can understand how the model works.

3.1 Content Analysis – An Overview

Content analysis is a research method used to discover characteristics of communication. The communication may take any form: conversations, television, letters, diaries, newspapers, and many others. Content analysis seeks to describe certain aspects of communication depending on the researcher's intentions. For example, content analysis may be used to determine the types of products featured in prime time commercials, the categories of news frames used by a given newspaper, the number of times a mother gives command-like statements during a conversation with her child, or the relative frequency of sentences referencing various themes in a literary work. Content analysis methods are flexible and adaptable to a wide variety of disciplines, communication types, and formats.

The methodology of content analysis can be divided into two major categories: qualitative content analysis and quantitative content analysis. Qualitative content analysis (sometimes called thematic) focuses on the meaning of words, phrases, or sentences in the pertinent communicative text. In the examples listed above, the first two – types of products in commercials and categories of news frames – are examples of qualitative content analysis. The analysis can be conducted on a single level (word, phrase, sentence) or on several levels, depending on the research. Qualitative content analysis is used often to describe categories preparatory to frequency analysis, which is the heart of quantitative content analysis. The latter two examples in the previous paragraph—the number of command-like sentences and the relative frequency of themes—are examples of quantitative content analysis. Other

methods used to characterize text/communicative data are grounded theory, historical survey, phenomenology, and ethnography (Hsieh & Shannon, 2005, p. 1278).

Busch et al. (2012) categorize content analysis as conceptual or relational. In conceptual content analysis, the level of study is the idea, represented by a word or phrase. Relational content analysis examines the relationships between concepts that appear in the text; therefore the unit of study is usually the phrase or sentence. Theories about linguistics, cognitive science, and mental models are the background of relational content analysis.

Content analysis has been used in research since the 19th century and perhaps further back than that. At that time all the coding was done manually. In the early 1900s, students of journalism began to compare newspapers by measuring column inches devoted to a particular news story. Later, as radio, newsreels, and television became popular, similar measurement methods were used to compare and contrast news stories as presented by various media. In literature studies, content analysis was used to find rhyme schemes, the proportions of one part of a speech to another, and so on (Riley & Stole, 1968). Producers of educational materials counted words, defined the proportion of easy to hard words, and determined the average length of sentences in order to ascertain the average reading levels of textbooks.

Sorokin used a form of content analysis to document social and cultural shifts in Western Europe; Lasswell categorized psychiatric patients' interview responses. Later, Lasswell studied propaganda during and after World War II ((Riley & Stole, 1968). By the 1940s, CA was a frequent research method for the social sciences in spite of being heavily labor-intensive. With the introduction of mainframe computers, analysis was done increasingly by using punch cards and later by direct keyboard input. Early CA dealt primarily with word counts, and thus was quantitative. According to Busch et al. (2012), by the 1950s social science researchers realized that the examination of meanings and relationships was required to get more insight into the human mind and its communication with other minds. When Berelson (1952) wrote his survey of content analysis as a research technique, he found that most of the literature used Lasswell's model—persuasive one-way mass communication—which derived from his work on propaganda (Riley & Stole, 1968). In the

1950s and 1960s use of content analysis became a common way of measuring differences between communicative texts.

Before scientists decide to use content analysis, they should take time to think about their intended research goals (Kondracki, Wellman, & Amundson, 2002, p. 225). The content analysis process can proceed inductively, deductively, or both (Elo & Kyngäs, 2008, pp. 107-115). When there is extensive knowledge of a phenomenon, or if a theory is being tested, a deductive process is used. Inductive processes are commonly used when the phenomenon has little or no previous research on it. Both deductive and inductive processes are conducted in three phases: preparation, organizing, and reporting (Elo & Kyngäs, 2008, p. 108). Kondracki et al. (2002, p. 226) note that inductive methods are used most often with qualitative studies, and deductive methods with quantitative studies.

Additionally, a conceptual framework should be established so that results can be analyzed in terms of the research question. This can be a framework used by previous researchers, a modification of a previous framework, or one that is completely new (Gerbic & Stacey, 2005, pp. 45-59). A new framework can be directed by theory (top down) or derived from a data set (bottom up). Frequently, this process has seven (or more) stages: data collection, examination of a subset of data to look for patterns, development of a conceptual framework based on the patterns, explication of the hypothesis, testing the hypothesis, re-evaluating the framework as needed, and retesting. This cycle continues until a stable, supported framework has been created, and the research is reported.

The strengths of content analysis as a methodology are many. These include: 1) use of retrospective data, 2) tracking messages over time, 3) assessment of changes, 4) detection of trends, 5) unobtrusive nature, and 6) lower costs. But there are also limitations to any research method, which need to be considered before a method is chosen. Some limitations of content analysis include: 1) inability to determine causality, 2) limitation to inferences, 3) labor- intensiveness, 4) lack of generalizability (Kondracki, et al., 2002, p. 227).

According to Weber (1983, pp. 127-149), one disadvantage of content analysis before the 1990s was the avoidance of disputes about competing techniques, such as disagreements about word counts vs. category counts, categorization of words into single or multiple categories, use of preconceived dictionaries rather than word lists derived from the texts

using factor analysis, and the integrated methodological framework. In order to develop the methodology further, it was important for researchers to examine these disputes and look for a consensus to unify research protocols as much as theory would allow.

Before data collection begins, it is wise to consider how the data will be processed, using manual, computerized, or hybrid techniques. This is an important decision because it can affect how and what data are collected. According to Kondracki et al., several factors should be taken into account: “amount of material to be analyzed, the number of researchers involved in the analysis, their level of experience with related methodologies, financial constraints, and long-term goals” (Kondracki, et al., 2002, p. 226). The availability of appropriate technology as well as individual familiarity with such also plays an important part. Care should be taken that the limitations (or “fun” features) of a given software package do not alter the research questions unduly. A valid, strong research design is always more important than powerful software, since it is the former and not the latter that will determine the final worth of the research.

Content analysis can be used for many different purposes by researchers in the humanities and the social sciences. Altheide (1987, pp. 65-77) describes a method of combining ethnography (field work, case studies, etc.) and content analysis in ethnographic content analysis (ECA) in order to gain the strengths of both. Woo (2003) used content analysis to examine hacked web pages in order to determine how they were changed, particularly in regard to emotional content and propaganda techniques. The study of crime, race, and aggression as portrayed in “reality” TV was facilitated by content analysis (Oliver, 1994, pp. 179-193). Conway (2010, pp. 23-35) “mined” biographies via content analysis based on keywords and a learning algorithm; he found that the algorithm was more complete and more accurate than keyword analysis, and the difference was statistically significant. A content analysis of food messages during prime time television revealed that 60% of these messages referred to beverages and sweets that were low in nutrients (Story & Faulkner, 1990, pp. 738-740). Graneheim & Lundman (2004, pp. 105-112) evaluated the use of qualitative content analysis in nursing research. Content analysis has also been used in psychiatry to aid mental health workers in discovering what is inside the mind of a person with mental illness (O'Dell & Weideman, 1993, pp. 120-125; Pestian, Nasrallah, Matykiewicz, Bennett, & Leenaars, 2010).

One of the uses of content analysis is determining sentiment—opinions expressed by individuals on any topic from presidential candidates to the local micro-brewery. Web sites devoted to product and service reviews offer companies a rich opportunity to find out what the public thinks about them. Zhang et al. (2009, pp. 2474-2487) reported that most studies on sentiment analysis have been conducted in English; very little attention has been directed to Chinese, another widely used language. They note linguistic differences between Chinese and English that might prevent methods used with English from being suitable for Chinese documents (such as a lack of spaces between words, an increased number of adverbs, and a large variety of syntactic dependency) and suggest a rule-based framework for sentiment analysis of Chinese documents (Zhang, et al., 2009, pp. 2475-2477).

Qualitative analysis, although it may include frequency counts and other numerical (quantitative) measures, focuses on the meanings of words, phrases or clauses and how they relate to each other. The first step is coding the meaningful units of the text according to the intentions of the researcher—i.e., if the topic of study is pragmatics, meaning units would be categorized and coded according to what pragmatic purpose each one served. Huber and Garcia (1991, pp. 326-347) identify three reasons for this process: “a) it is the core activity of descriptive text analysis; b) developing categories reduces the amount of text material; and c) interpretations can be better scrutinized for objectivity, reliability, and validity, or corresponding criteria more adequate for qualitative research” (Huber & Garcia, 1991, p. 327). They point out the necessity of internal validity. If the codes are not used consistently, then any conclusions drawn from the coding process may be completely spurious.

After the list of categories is developed, the texts are coded and validity is checked, researchers look for patterns that show two or more codes occurring together. The patterns can then be analyzed according to theory. Huber & Garcia (1991, p. 327) note that “differentiation according to types is a simple form of conceptualization; it may lead towards the formulation of theoretical assertions.” The first task is to become aware of patterns, then formulate hypotheses based on the patterns. If the original pattern was coincidental, it will probably fail under hypothesis testing. The authors state that two-dimensional matrices are most useful, especially in the early stages of theory development, because relationships are much clearer and easy to see. However, given the complexity of human interaction, higher dimensions will likely be needed at some point (Huber & Garcia, 1991, p. 238).

Ahuvia (2001, pp. 139-172) examines traditional content analysis to determine what changes might be made to the process so that it is more accurate and valid. He introduces two other types of content analysis, interpretive CA and reception based CA, to be used as adjuncts to the traditional type. Lasswell divided CA into manifest CA (examines obvious meanings) and latent CA (looks at subtler meanings), and noted that latent content is not easily found using traditional content analysis, primarily due to interrater reliability issues. It is impossible to create a set of coding rules that will cover the underlying connotations of a text, and even if that were possible, it is difficult for two individuals to have the same understanding of connotations as related to a given theoretical construct.

Ahuvia stresses the importance of justifiability over interrater reliability in latent CA. His interpretive content analysis does not utilize coding rules and reliability statistics; instead, independent replication of interpretations is the goal (Ahuvia, 2001, pp. 148-149). Traditional CA also emphasizes the way the coders understand the message, which is not necessarily the way the author intended it or the way that other people would understand it. The author suggests reception based CA; that is, if the text is to be coded according to how a certain group would view it, then that group should code it. Qualitative examples of this principle include focus groups and audience ethnographies (Ahuvia, 2001, p. 154). Reception based CA is “a fusion of survey research and traditional content analysis.” Coders would be selected from the intended interpreters, and their training would not be based on eliminating subjectivity, but in measuring it. Similarly, no intercoder agreement would be needed; in fact, it would be against the overall goal. Ahuvia states that reception based CA would not be feasible or even advisable for some research questions, but it is a useful adjunct technique for others (Ahuvia, 2001, p. 158).

Hsieh & Shannon (2005, pp. 1277-1288) examine three forms of qualitative content analysis: conventional, directed, and summative. Conventional qualitative CA is used to explore data and determine appropriate categories for coding, rather than setting up the categories before coding begins. The reason for this is usually the fact that research in the area of interest may be sparse. The most important goal is description. Conventional qualitative CA has the advantage of being unbiased by previous research or theories. However, researchers may not gain a full understanding of the categories present, or the devised categories may overlap. This is a problem of internal validity. Also, conventional CA is very similar to other

research methodologies such as grounded theory or phenomenology, but CA is more limited than the others.

Directed qualitative content analysis is used when a research question has been partially studied and theories have been derived, but there are still questions that have not been answered. The theory or theories derived generally require additional conceptualization or validation; as a result, the process of coding is more structured than with the conventional approach. A system of codes based on theory/previous research is established before coding begins. If some of the data cannot be coded, additional categories are created. Directed content analysis can provide evidence supporting the theory, but this method does not generally produce results that can be subjected to statistical tests (Hsieh & Shannon, 2005, p. 1282). The main disadvantage of directed CA is the bias that coders have based on previous research and established codebooks. This bias may prevent them from noticing important contextual factors and may encourage them to force texts into predetermined categories when they should develop new, more appropriate, categories.

Hsieh & Shannon (2005, pp. 1283-1284) state that summative content analysis is focused on usage rather than meaning. This is also called manifest content analysis (see Ahuvia above). However, usage statistics (which constitute quantitative CA when used alone) lead to the analysis of latent or contextual CA, in which the goal is to discover underlying meanings (i.e., connotations) of words and phrases, beyond the obvious literal meanings. For example, the study of euphemisms or idioms would require latent CA (Hsieh & Shannon, 2005, p. 1284). Advantages to the summative approach are its unobtrusiveness and relative lack of reactions in the observer; disadvantages include reliance on credibility and a requirement for rigorous validity evaluation.

Smith & Taffler (2000, pp. 624-646) analyzed the chairmans' statements of company annual reports to determine if any association existed between the characteristics of these statements and the company's likelihood of failure. Since the substance of an annual report is entirely discretionary, most people view documents of this type as little more than advertisements, with little or no actual information about the company. The authors chose to classify the cognitive structures of the chairmans' statements along four dimensions: "evaluative (positive/negative), potency (strong/weak,) activity (active/passive), and

manageability (expected/unexpected).” They formed two hypotheses based on content analysis: H1, that a combination of keywords is associated with company failure, and H2, That themes from the chairman’s statement are associated with company failure. Correlations at the 0.05 level were noted between “positive” statements and positive dividend news; “negative” statements and negative trading as well as negative dividend news; and “passive” activity with contraction. The associations between “positive” statements and positive dividend news, and “active” with growth/expansion, were significant at the 0.01 level. Thus, both null hypotheses could not be rejected, as a clear relationship between keywords and themes in the chairman’s statement and the company’s eventual failure existed (M. Smith & Taffler, 2000, pp. 635-636).

Some authors identify quantitative content analysis as equivalent to “content analysis”; i.e., that qualitative content analysis is a contradiction (Neuendorf, 2002). Zeh (2005, pp. 1-10) identifies quantitative content analysis as “a highly selective and structured method… of measuring and counting… media content.” One of the goals of quantitative CA is to provide for the statistical analysis of large amounts of data. By analyzing the content of media, the data is simplified and patterns may be seen. Zeh identifies six phases in this process: 1) the research question, 2) conceptualization & operationalization, 3) planning, 4) training and testing, 5) coding, and 6) reporting. As in all research methodologies, reliability and validity are essential, so a codebook is used to provide the rules for coding. But before coding can begin, the characteristics of the sample itself and of the instrument must be determined (Zeh, 2005, p. 5).

Lombard et al. (2002, pp. 587-604) reviewed the literature on intercoder reliability in content analysis and found that a large percentage of CA studies did not report reliability at all, and when they did report it, there was no standardization. They compared five common measures of reliability and made suggestions for their use. Krippendorff (2004, pp. 411-433) critiqued their article, correcting misconceptions that he saw about reliability measures, and indicated three necessary conditions for reliability indices: it must be applied to proper reliability data, it must treat units of analysis as categorically separate, and its values must correlate under imperfect conditions. He compared seven measures of agreement, including the five that were evaluated by Lombard et al., and suggested that the reliability of all variables, even minor ones, should be tested.

Roberts (1989, pp. 147-177) outlined a linguistic technique of content analysis and a method of determining face validity. Previously, researchers debated the application of content analysis techniques to objective *and* impressionistic content; according to Holsti in 1969, the methodology could be used for both. Roberts's technique, with the clause as the analysis unit, makes the best of two worlds. Since the clause and not the word is the unit of analysis, there are more contextual clues than in ordinary quantitative analysis and the relationships between words can be seen. At the same time, it is easier to determine what the author meant and therefore subjective effects are reduced (Roberts, 1989, p. 148).

Roberts (1989, p. 153) points out that one should not put too much importance on words that co-occur, as there is the danger of assuming that these words are related. However, as long as the researchers remember this *caveat*, it is useful to examine co-occurring words (up to a point). At least a part of the results should be checked manually to ensure that the relationships seen in the data are real. Face validity was checked by taking the computer coding and translating it back into words/clauses. This process indicated that the linguistic technique of quantitative analysis was valid, but it lost considerable information in the process. That is, coding the texts did not preserve the meaning very well (Roberts, 1989, p. 170).

Rourke & Anderson (2004, pp. 5-18) state that, although quantitative content analysis is presented as a systematic way of analyzing communication, it would be more rigorous to view it as a testing instrument so that validity can be computed. They present a method of creating a theoretically valid coding protocol as well as a method of testing validity from empirical data. In many cases, quantitative content analysis is used to make inferences about constructs, which requires a higher level of validity. In order to create a protocol that will be theoretically valid, Rourke & Anderson (2004, pp. 8-13) suggest the following steps: 1) identify the purpose of the coding data, 2) identify behaviors that represent the construct, 3) review categories and indicators, 4) hold preliminary tryouts, and 5) develop the guidelines for administering, scoring, and interpreting the coding scheme.

Even after the above steps have been followed to develop a theoretically valid protocol, it is necessary to test its validity using empirical data. Three methods of determining validity commonly used in social science research are correlational analyses, examinations of group

differences, and experimental or instructional interventions. In the first case, the measurements made through quantitative CA are compared with measurements of the same construct using other methods. Examinations of group differences, which can be cross-sectional or longitudinal, determine whether the instrument (i.e., quantitative CA) can distinguish between the groups. Finally, validity can be measured by comparing the results of analysis before and after an intervention, either experimental or instructional. It is expected that the instrument would detect the change associated with the intervention if it is a valid measurement (Rourke & Anderson, 2004, pp. 14-15).

Hopkins & King (2010, pp. 229-247) report on methods of automated content analysis which can be used for large data sets to determine the approximate number of documents in each category. They note that social scientists often want to know the document category proportions of a very large document set, but most coding schemes make this impossible, even those that are computer-assisted. As an example, the researchers say, “Policy makers or computer scientists may be interested in finding the needle in the haystack… but social scientists are more commonly interested in characterizing the haystack” (Hopkins & King, 2010, p. 230). Because they contain assumptions that are required for individual document analysis, previous methods produce biased estimates of category proportions. The authors introduce a new method by describing their analysis of blog post opinions about Senator John Kerry. The categories are expressed sentiments about the candidates in the 2008 American presidential election. Specifically, the goal was to compute the proportion of blogs each day or week in each of seven categories, from extremely negative to extremely positive plus NA (no opinion) and NB (not a blog). This method was applied to blogs before, during, and after Kerry’s 2006 joke which caused him not to enter the 2008 presidential race (Hopkins & King, 2010, p. 232). They derive a matrix expression to allow estimation of document category proportions in the population based on a labeled, hand-coded sample. This does not require any parametric assumptions, but linear regression reveals that the estimates determined by this method are very close to the actual proportions (Hopkins & King, 2010, p. 239).

Quinn et al. (2010, pp. 209-228) proposed a similar method that estimates both “keywords that identify particular topics, as well as the division of topics, from observed data.” This permits a jump directly into quantitative content analysis without a priori determination of

categories and coding rules, which is required even for computer-assisted CA. The authors developed this method and tested it on data from the U.S. Congressional Record for the 105th to the 108th Senate, resulting in daily data regarding the attention given to topics in the Senate from 1997 to 2004.

This was an overwhelming amount of data for other coding techniques, and it required substantial mathematical manipulation to develop the model (Quinn, et al., 2010, pp. 213-214). First, it invoked probability theory with regard to the probability of a speech on a particular topic on a particular day; then it produced a vector containing word frequencies from each speech. The vectors were stacked into matrices in two dimensions: the number of words in the resulting vocabulary, and the number of speeches. An Expectation Conditional Maximization algorithm was used to provide the model; model-fitting, according to Quinn et al. (2010, pp. 214-215), takes between twenty minutes and three hours, depending on the data and the computer speed. It should be noted that no user-supplied information about topics was required, so the model-fitting proceeded unsupervised.

The first popularly used computer program for content analysis was the General Inquirer program introduced by Stone et al. in 1966. It was considered the prototype for future software. The first task of the General Inquirer program was to create a dictionary which might be broad in scope or narrowed to the topic being studied. Vocabulary for the dictionary could be derived from the data, inductively, or it could be determined by general constructs, deductively. The computer “read” the text and found matching dictionary words for words in the text. The occurrence of the words was counted (Mergenthaler, 1995, pp. 3-32). Kranz (1970, pp. 377-380) described a similar program that extracted key words and analyzed them according to a semantic dictionary. By 1975, the General Inquirer included several all-purpose dictionaries, as well as the ability to disambiguate homographs. Dictionaries in languages other than English were also available (Weber, 1983).

Weber (1984, pp. 126-147) discusses the utility of computer-assisted content analysis in which the word or phrase is the basic unit. Methods of text manipulation are illustrated, including frequency counts, key-word-in-context lists, categorization, category counts, and concordances. He points out that the advantage of computer coding is that rules for coding must be made explicit for the computer; this means extensive consideration of the research

question and thorough operationalization of concepts. However, this need for explicit instruction is also a disadvantage, since it is sometimes difficult to describe the criteria exactly, for example, differentiating between a “power-authoritative” category and a “power-doctrine” (Weber, 1984, p. 136). Other problems include how to deal with homographs (words that are spelled the same but have different meanings), overlapping categories, and disambiguation into categories at different levels (Weber, 1984, p. 135).

Van Cuilenburg et al. (1988, pp. 65-97) examine the application of computers to content analysis using several different approaches. They note the difficulties of interpreting language in syntax and semantics, both of which are required for understanding. However, it is not necessary for computers to understand language in order to carry out tasks such as parsing (separating sentence elements and determining their relationships) or counting the number of times the word “cow,” for example, appears in a story. Understanding becomes more important when syntax is complicated, the unit of analysis is related to higher structures (such as narratives) or if research is looking for hidden (latent) meanings. Van Cuilenburg et al. (1988, pp. 76-78) point out the difficulty of passive sentences in which word order alone would suggest a different meaning from what is intended. Context is required for deeper meaning and structures, but how would one instruct the computer to find the appropriate context?

With regard to semantics, all languages contain words that are similar in meaning with only subtle differences, as well as words that sound the same but have completely different meanings and sometimes different spellings. Questions such as “What are the emotional connotations of the word ‘kill’ versus ‘murder’?” are almost impossible to program. Researchers have turned to cognitive psychology for help in teaching computers to understand language. One approach that has been used is prior knowledge scripts. According to van Cuilenburg et al. (1988, pp. 79-81), a person makes six kinds of predictions when reading: 1) syntax—expected part of speech, 2) semantic—expected case such as subject or object, 3) context—needed information, 4) pragmatics—the purpose of the text, 5) individual memory—of the text or of similar texts, and 6) cultural memory—the prior knowledge shared by members of a culture. Some or perhaps even all of these prior knowledge scripts could be programmed, particularly for texts with known structures (such

as news stories). The authors conclude that computers cannot yet analyze content without human help, but they can help human beings analyze content.

Colby et al. (1991, pp. 373-387) used narrative grammars of plot structure to aid in computer-assisted content analysis. The basic unit in this type of data is an eidochronic unit, which refers to a unit in time or in the sequence of a narrative. These units can be of differing lengths, and there can be multiple levels in the same story. Based on the theory of narrative grammar, they developed a computer program, SAGE (System for the Analysis and Generation of Eidons), to facilitate coding of literature for content analysis. The eidon rules the researcher creates for the program can be tested by comparing a hand-coded document to a computer-produced document. Appropriate adjustments can then be made to the eidon rules. This method of coding is particularly helpful in the study of oral tradition and folktales (Colby, et al., 1991, pp. 380-383).

Mergenthaler (1995, pp. 3-32) proposed a model for computer-assisted content analysis in the terminology of information systems. Natural language is identified as a real system and formal language as a formal system. Each of these has an object-linguistic and a meta-linguistic component. Based on these definitions, the text is first translated from the real system into the formal category system, then the category system is interpreted by theory, and finally the results are verified by returning to the text. A computer can carry out the first step, but only if the data is in the proper format. Formatting can also be done automatically, however. The second step represents coding and is generally completed or at least guided by human skills.

Besides vocabulary, the dictionary may also contain information concerning how words relate to one another, which can be used for syntactic coding. Also, words can be “clustered” so that the presence in the text of one or more words from a cluster will activate the other words, thus providing for context and some prior knowledge (Mergenthaler, 1995, pp. 15-16). Additional contextual information can be gained using referential activity, which is the amount of active links between the verbal and non-verbal systems (Mergenthaler, 1995, p. 22). As coding proceeds, categories can be added or subtracted; words can be assigned to more than one category. This method of content analysis requires a certain length of text based on reliability, generally estimated at 500-1000 words.

Kelle (1995, pp. 33-62) reviewed a number of second- and third-generation software packages designed to assist qualitative data analysis. Second-generation programs included Qualpro, The Ethnograph, and Hyperqual, all of which were at that time (1995) being used extensively by the qualitative research community. However, this was not true for third-generation software such as AQUAD and HyperRESEARCH (which are discussed further below). Kelle postulates that the newer programs may be less useful to qualitative researchers since they have advanced features that are not needed and that may have steep learning curves.

The advent of the personal computer was a tremendous boon to content analysts, although they did not realize it right away, since the early operating systems were difficult to use and took considerable time to learn. However, once they had mastered the PC, researchers found many uses particularly in text management. Tasks such as building indexes, adding cross references, and comparison of text passages became much easier and more flexible. Kelle (1995, pp. 33-62) reports that prior to this time, “cut and paste” in documents literally meant “get out the scissors and glue.” Codes were used as “pointers” or “tags” that could retrieve the desired texts. Kelle suggests that the aid of computers made it much easier for researchers to browse the data, get a feel for it, define hypotheses and test them, and then return to the data to modify the hypotheses until they became more accurate. However, it is important to realize that computers do not lend statistical power to qualitative data. The limitations of the data, which is often nominal or ordinal at best, limits the kind of statistical tests that could be applied to quantitative data (Kelle, 1995, p. 42).

Mair (1995, pp. 64-75)discussed the issue of machine-readable text and its relationship to computer-assisted content analysis. Once the text is readable by the computer, it is possible to retrieve and test large segments of data, extend research on the data to others around the world, and preserve the original data with textual and situational contexts intact. The advent of scanners and Optical Character Recognition (OCR) has led to a revolution in text manipulation.

Franzosi (1995, pp. 157-172) examined ways of improving the efficiency of computer-assisted coding, since even with computers, complex analyses require preparation of the data and other human input. Similar to Colby et al. (1991, pp. 373-387), he suggested that

use of semantics—deep structures such as story grammars, news schema, and multiple levels—can speed the process of coding. Using schema provides a template for the resulting coded information.

Fragmented coding, in which each coder only handles specific information, has the advantage that a particular coder can complete articles quickly because s/he is always looking for the same thing and there are a limited number of categories. Franzosi (1995, p. 164) points out that this approach has utility when key words are the most important unit of analysis and the data cannot be machine coded. When deep structures are considered, however, fragmented coding is no longer feasible. In order to reach the underlying levels of meaning, a single person must read and comprehend an entire unit of text, adding substantive knowledge to the interpretation.

Sampling is another method of increasing content analysis efficiency; however, sampling procedures sometimes create bias. It is also important to recognize that the creators of the texts, such as newspapers, also create bias. Sampling can be done within texts for a lower cost (Franzosi, 1995, pp. 169-170).

Evans (2000, pp. 246-257) discussed video processing with regard to the automated analysis of pictures and audio based on context. Systems have become available that can index, categorize, and summarize video without the aid of human beings. Social scientists have used content analysis to study television programs for almost as long as television has been available. Unfortunately, the process of creating video systems to aid in this task was slow. The first content-based image retrieval programs used still images, translating them into pixel patterns in order to classify and identify them. Color, texture, and shape can be assessed using pixels; areas in which these tasks are highly important include satellite pictures (military and civilian) and medical imaging. Face recognition techniques are quickly improving, and “naked people finder” programs are used in software that blocks offensive Internet content.

Video, which usually includes moving pictures and speech, is much more complicated, but the principles are similar. News programs are automatically indexed by the Virage Videologger system, which can parse video by camera motion, speech recognition, and other methods. The content-analysis applications of these programs is obvious. Software that can

parse and transcribe video removes most of the preparation of the data that would require human interaction. After preparation, the text and/or the pictures can be coded just as they would be manually (Evans, 2000, pp. 250-252). Guimaraes et al., in 1998, developed a system to preprocess newscasts, parsing them into stories and generating story summaries. These were then coded by humans. However, they suggested that automatic content analysis would require only a few more algorithms.

Guo et al. (2008, pp. 613-630) studied computer text categorization using a cognitive situation model. The task of text mining involves categorization, information retrieval, and measurement. In order for the categorization process to lead to construct understanding, it must be context-related and not based on single words alone. A cognitive situation model is a type of mental model that people create as they read a document and combine their understanding of what they are reading with prior individual and cultural knowledge. The program CogCate (Guo, et al., 2008, p. 614), a categorization system that was inspired by the cognitive situation model, examines text structures above the word level and verifies categorization with syntactic and semantic analysis. In addition, the automation of this procedure creates a significant reduction in time and effort required for CA.

Situation models include many dimensions: time, space, actors, intentions, causes, and associations. All these dimensions are important because they contribute to understanding the text. According to Guo et al., a reader keeps track of these dimensions and updates the mental model as more information is gathered. For instance, a person reading a news story about a fire will include the following information in their model: when the fire occurred (time of day or night), where it occurred (a home, office, school), who was involved (fire victims, firefighters), how the fire started, if known, and whether arson might be involved. All of these pieces of information are important in constructing an accurate mental model. As a result, they are all needed for proper categorization of documents in content analysis (Guo, et al., 2008, pp. 614-617).

Conway (2010, pp. 1-29) conducted a study of second-level agenda-setting and, in addition, compared traditional human coding with computer coding. Because the study dealt with how people think about an issue, more than just counting words was required (Conway, 2003, p. 2). This was a new perspective on the use of computer-assisted content analysis.

The data involved the media's portrayal of two potential Democratic candidates (Tony Sanchez and Dan Morales) and one Republican candidate (Rick Perry) for Texas governor in the 2002 primary election. This was the first time two minority candidates (both were Hispanic) competed against each other in a statewide race. The specific research question was: "What were the substantive and affective attributes used in the newspaper coverage to describe the candidates and which of those attributes were used most frequently?" The same question was later examined through survey data.

Traditional coding found that the most frequently mentioned attributes for the three candidates were as follows: Tony Sanchez—wealth, Dan Morales—former state attorney, Rick Perry—current governor. Both types of coding also found experience level, ethnicity, and occupation to be important attributes for Sanchez and Morales. But considerable differences were seen in the processes used by humans and computers to reach these judgments (Conway, 2003, p. 8).

The coding of newspaper articles was preceded by the development of a codebook from a voter survey and from previous newspaper studies. The unit of analysis was any reference to the candidate's image; all newspaper articles were coded manually by twelve graduate students using the codebook. Two students coded each paragraph, and if they did not agree, a third person helped them make a decision. Simultaneously, a computer program (VBPro / VBMap) coded the data using the same data set, sampling unit, and codebook as the human coding.

The computer coders attempted to use the same unit of analysis—the reference to a candidate's image—but since a computer cannot recognize this semantic category, a word or collection of words had to be substituted. Changes also had to be made to the data set and the codebook used with the computer program. Human coders modify a codebook as they proceed with coding and recognize that new categories are required or that certain categories overlap. This was impossible for the computer coding; all the needed codes had to be well-defined before analysis could start. First, the number of codes was reduced from 90 to 25 by excluding attributes that were not technically "image" information. Next, the data set was formatted. The most difficult aspect of the computer coding was determining the best way to instruct the computer on what words to look for, so that those words would

represent the references found by human coders. Trial-and-error was required, and the program VBMap was also used to find the important words (Conway, 2003, pp. 12-15).

Once the codebook was derived and used to find occurrences of relevant words, some method of relating the words to the candidates was needed. This was achieved by separating paragraphs in the data set according to when the candidate was mentioned by name. However, manual examination of these new data sets showed considerable overlap of candidates mentioned in each paragraph, particularly with Sanchez and Morales, who appeared in half of the other's paragraphs (Conway, 2003, pp. 15-17). The entire process was then repeated in order to determine the affect that was demonstrated by the newspaper articles. Since affect is related to context, some way had to be devised to tell the computer what the context was. Manipulation of the data set was the first step, then a new codebook to determine positive/negative affect was employed (Conway, 2003, pp. 17-18).

Conway (2003, p. 19) points out that, because the processes of coding for humans and computers were so different, it was impossible to compare the two on specific candidate attributes. Comparisons were only possible on general candidate attributes; otherwise, there would have been an "apples-to-oranges" situation. Differences in methods included the data set, the sampling unit, the unit of analysis, the candidate attributes, and the means of assigning affect. The author states that the nature of the research question, which dealt with second-level agenda-setting, made the problem more complex than it might have been in a study with a simpler question. However, past research on frames used only articles about one candidate, so there was no need to match candidate names and attributes (Conway, 2003, pp. 20-21).

Huber & Garcia (1991, pp. 330-333) describe the program AQUAD 3.0 (Analysis of QUAlitative Data) which was designed for the examination of relationships between ideas. As of 2012, the program is available as AQUAD 6.0, with a 7.0 version in beta testing. According to the website, the current version offers extended features, including the following: 1) the ability to analyze video, audio, and pictures without transcripts; 2) creation of a master code list to speed the entering of codes; 3) code length up to thirty characters; 4) word analysis with a variety of dictionaries; 5) separation according to speaker or another

unit in audio, video, and text files. The next version (7.0) will have an integrated open-source statistical package (Huber, 2012).

Muhr (1991, pp. 349-371) reported on a personal computer program called ATLAS/ti which was designed to facilitate content analysis with an easy-to-use interface. It was intended to be a tool to support "the human interpreter, especially in the handling of complex informational structures." Thus, there was no attempt to make it carry out the complex processing that occurs in the human brain.

Dennis & Bower (2008, pp. 423-437) used ATLAS.ti 5.0 to study answers to open-ended questions on a survey of library users' satisfaction (LibQUAL+™). Although prior work with this survey had included some qualitative analysis, the focus was on quantitative issues. A total of 754 comments were organized and coded into categories. The authors note that the "process of unit identification is an iterative process; that is, the researcher develops, merges, and collapses units while progressing through the analysis." Thus, it was necessary to create a list of categories before the software could do its work (Dennis & Bower, 2008, p. 425).

Dennis & Bower (2008, pp. 425-426) selected ATLAS.ti 5.0 for several reasons—flexibility, ease of use, fast search features, and the ability to select more than one code for a piece of text. Also, ATLAS.ti had been used in the development of the LibQUAL+™ tool, so it made sense to analyze answers with the same tool. The authors identify the following common coding options: open coding, code in vivo, and code by list. The first option is used when developing a new code from a set of data. When a researcher wants to use a direct quote as the code, this is called code in vivo, and code by list is applied when the codebook is already established (Dennis & Bower, 2008).

The first round of open coding resulted in a set of themes or categories that described the members of the data set (Dennis & Bower, 2008, p. 427). These categories were examined to determine overlap so that similar categories could be combined. This would improve the specificity of the end result. Also, since many individuals who completed this survey made general comments, a means of coding approval/disapproval was devised. Another difficulty arose when related categories produced contradictory results (Dennis & Bower, 2008, p. 430); this indicated the need for further code revision. Categories were grouped into five

overall themes and arranged in hierarchical order from general to specific. Finally, the results of the qualitative analysis were presented to library administrators for their use in future library policy (Dennis & Bower, 2008, pp. 430-431).

ATLAS.ti is currently in version 6.0, with version 7 expected soon (as of March 12, 2012). Features of ATLAS.ti 6.0 include easy access to functions, support for almost all data formats, drag-and-drop coding, analysis to the levels of character, pixel, millisecond, or frame, reliability testing, and survey imports (GmbH, 2012).

Hesse-Biber et al. (1991, pp. 289-306) presented a program designed for Macintosh computers called HyperRESEARCH. The software was applicable to text, graphics, audio, and video materials and both quantitative and qualitative analysis. The authors state that the structure of the program is based on one study at a time, with a study being one or more cases. A case may include data from multiple sources. HyperRESEARCH has three parts: 1) coding, 2) searching and reporting, 3) hypothesis testing. The text is coded by selecting portions and assigning a code. Coding can also be done automatically if desired, once a Code List has been established. To check coding, the researcher clicks on the code to read the associated text. The researcher can attach comments and observations to a given case as well.

Once text is coded, it can be searched based on certain codes of interest. The source material (written, audio, etc.) can also be specified. Reports can be generated to provide whatever information about each case is requested. Finally, hypotheses can be generated and tested using HyperRESEARCH by “coding the codes” as true/false, depending on a criterion such as positive, negative, or presence, absence in a given case. Production rules of the IF… THEM… type test the hypothesis. If the hypothesis fails, the program will report the reason. As of 2012, HyperRESEARCH version 3.0.3 is available as a cross-platform (both Mac OS X and Windows), qualitative analysis software. A related program called HyperTRANSCRIBE is also available.

Richards & Richards (1991, pp. 307-324) described a qualitative data analysis system they named NUD*IST, which stands for Non-numerical Unstructured Data Indexing, Searching and Theorizing. Their purpose was to develop a program that could handle complex constructs and support emerging theories. The parts of the program include a document processing

system, a hierarchical indexing system, and an analysis system. The latter is considered concept based analysis because it involves control of the indexing system which directly represents the concepts being studied. NUD*IST supports both online and offline sources—i.e., diaries, drawings, books, clippings, etc. The program provides for a "tree" of categories, sub-categories, etc. Separate databases for documents and indexing allow for offline data as well as examination of the index structure by itself, so that the indexing system can become a "map" of the project. Boolean as well as non-Boolean searches can be done with NUD*IST. Nodes in the tree index are created and are associated with batch processing commands. In fact, nodes arranged in tables can be manipulated as qualitative matrices, with cells containing passages from the text (T. Richards & Richards, 1991, pp. 320-321). NVivo 9 is the current version of the original software.

In the above chapter I offered a general overview of the methods of content analysis. Some components discussed above will be used as technical solutions for this thesis. The exact method of content analysis used in this study will be discussed in the chapter below on new ways of news processing in content analysis.

3.2 New Ways of News Processing in Content Analysis

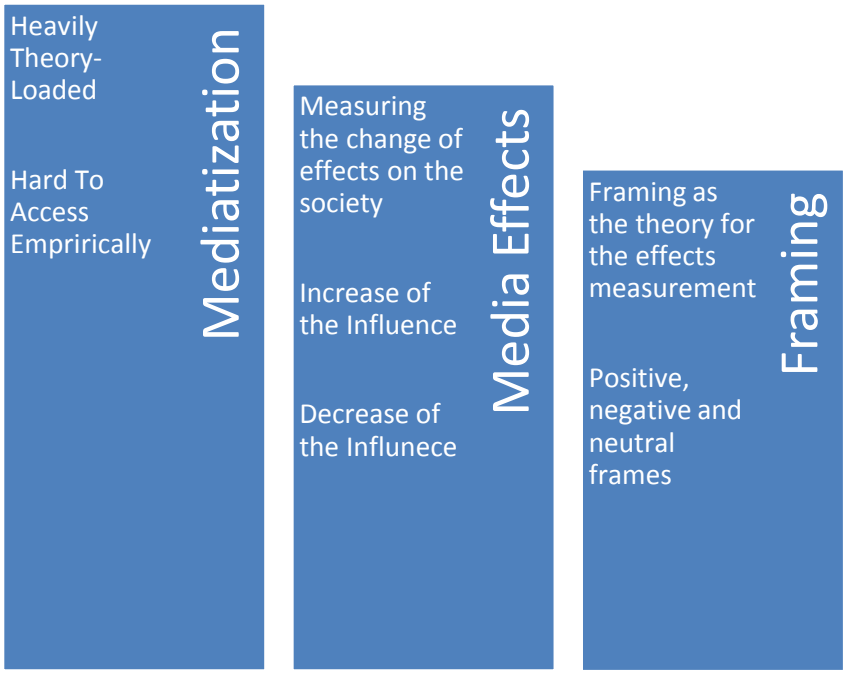
This study utilized quantitative content analysis as the major methodological tool for media sentiment measurement. The aim of the content analysis performed for this research was identification of frames in texts of various newspapers, magazines, and web pages. For the purposes of this study, frames are defined as codes embedded in text in an attempt to make certain aspects in the text more salient than others and to present them in a positive, negative or neutral light by providing problem definitions, interpretations, and moral, political, economic, social or personal treatment recommendations (Robert M Entman, 1993). These kinds of frames are referred to as basic frames. Behind them many other framing concepts exist. As the goal of the project was an all-embracing analysis of media messages in a time frame of at least then years, a quantitative content analysis was the only method which could be applied.

Before we get in details on the issue of sample gathering, we need to address the issue of the data collection in general and show how we utilized theories discussed in above chapters to do the empirical work.

Database I: News from various first generation news delivery systems	Database II: News from second generation news delivery systems	Database III: News from third generation media systems
• News collected using LexisNexis newspaper and magazine archive • 461 different news sources from the first generation news delivery systems • Over 70 000 different articles on US economy • 11 years of data	• News collected using crawling methodology • News collected on Reuters and Bloomberg Online web pages every minute over the 12 months period • Collected news related to the EUR/USD exchange rate	• News collected using Reuters xTra 3000 terminal • Data collected over the period of 12 months • Collected news related to the EUR/USD exchange rate

Graph 14 Three different databases for three different generations of media systems

Here I will attempt to explain why the design of the empirical part of this work make sense in terms of theory. First, let me briefly address the issue of mediatization once again. As we have seen in the above chapter, mediatization is a meta concept, and its empirical assessment is very hard. Therefore, empirical studies in regard to this subject are very rare. As already noted, I believe that we can "measure" increased, decreased or stable levels of mediatization by understanding how media influences society and how far-reaching is this influence. In order to understand this influence, we need to look at media effects. We have to attempt to understand what was the effect of media messages, say, in 1980s and what is it today and how these effects have changed.



Graph 15: Accessing Mediatization Empirically

As this topic has already been discussed in detail in previous chapters, I will not attempt to explain it once again. In fact, there are many ways to measure media effects on society and many researchers employ many different methods for this purpose. However, there have been only rare attempts to understand the mediatization process through media effects. I strongly believe that the theory of framing provides one of the best media effects measurement tools for scientists. By answering the question: "What are the effects of different media or news frames on the audience?" we can also answer the question "What is the effect of the media on the society?" because, as was shown above, the media tries to increase its overall influence on society by using different framing technologies.

In this thesis, the concept of framing is revisited once again. I understand frames a little bit differently than previous researchers. As we saw, for the most part, frames are viewed as very complex constructions. In some studies already discussed, framing structures are so complex that in order to detect them in a text or other form of media, one needs to analyze pages-long texts or minutes-long video or audio content. Knowing this, many researchers seek for four to five elements of frames (as defined by the Robert Entman) in a text in order to qualify the text as one which has been "framed." Some scientists come down to two elements and argue that at least two framing elements should be present in a text before it can be qualified as media content containing frames.

If we look at financial news releases, including audio or video files, we will notice that they are comparatively shorter than their equivalents in politics, culture or sports… this is due to the fact that nowadays the financial world is required to react to news announcements as soon as possible. Accordingly, writing long financial news articles or making twenty-minute long videos on some important events does not pay off. In no media segment is the shortness of the announcement and its reduction to the absolute core as important as in the financial segment. If we look at the framing theories discussed above, and we analyze financial texts accordingly, we will notice that the vast majority of financial texts, video and audio files are "frame free" as journalists and analysts writing on the subject simply not the time or space to develop text with complex framing structures. Does that actually mean that financial media use no frames? This is improbable. Analysts well-versed in financial media matters will argue to the contrary. Financial news is no less loaded with frames than, say, political news. Excluding financial news from the framing analysis because they have not "enough" framing elements is, in my opinion, a big mistake and limits the possibility of researchers understanding the very interesting world of financial news.

Of course, a text should have "framing elements" in it to qualify as text with frames. These elements are, as Robert Entman best put it, 1. Problem definition; 2. Causal interpretation; 3. Moral evaluation; 4. Treatment recommendation. Yet why do we necessarily need two of four elements in a text to say that frames are present? Does the journalist not provide us with certain frames when she or he judges an event as morally good or bad but does not offer the three other framing elements? Does an advertisement not provide a frame when it suggests we buy some product because of its uniqueness and positive nature? I think it does, despite of its extreme brevity.

Let me stick to advertisements for a moment because advertisements provide excellent examples. The first Coca-Cola ad published more than 125 years ago said: "Delicious! Refreshing! Exhilarating! Invigorating!"[12] Obviously, this first Coca-Cola ad provided causal interpretation, such as Coca-Cola is refreshing or Coca-Cola is invigorating. Should we really argue that this ad is frame free because it lacks problem definition, moral evaluation or treatment recommendation? Is not this short text of adjectives positively biased towards the Coca-Cola product? Does not it attempt to frame things in such a way that we go and buy

[12] More information at: https://www.coca-colaconversations.com/2009/05/the-first-ad-for-cocacola.html

the product because it will refresh and invigorate us? The text of the first Coca-Cola ad is probably, one of the most heavily frame-loaded texts ever written.

On the 16th of August, 2012, Reuters published a news item on its website entitled: "China H2 trade outlook severe, inward investment slows."[13] News with such brief titles and texts are very common in the financial markets. This title provides neither treatment recommendation, nor moral evaluation, nor causal interpretation. It simply defines a problem, and the title will definitely have very big impact on investors working with China. Would not it be a big mistake to argue that this title has no frames in it? I think it would. It provides a problem definition, and it defines a problem which could be a possible cause for the diminishing fortunes of millions of people, at least temporarily. Further, I believe that this title provides not only a problem definition frame but also a negative frame. We can see this in words like "severe" and "investment slows."

With this, we come to another point which I would like to make: texts have not only four (or less) listed framing elements, but additionally they are either positively or negatively framed. There is also third form of frames which I would call neutral frames. In neutral frames, the texts can be either free of positive or negative framing bias or have no frames at all. An example of positive framing bias would be this Bloomberg title: "Cisco Beats Estimates As Price Cuts Lure More Customers."[14] If we look at the title in terms of the four framing elements as developed by Robert Entman, we will note that this text has a causal interpretation only. It explains the success of Cisco in terms of price cuts. But at the same time and independently of that, the news is certainly positively framed. This we see by the words: "Cisco beats estimates." An example of a frame-free financial news title would be this one found on Bloomberg.com: "U.S. Stock Index Futures Little Changed Before House Data."[15] This title has neither Entman's frames nor a positive or negative bias. I would interpret this kind of text as one with neutral frames. A second example of neutral frames would be this, again from Bloomberg.com: "Yen Drops As Stock Gains, Yield Gap Curb Haven

[13] See http://www.reuters.com/article/2012/08/16/china-economy-idUSL4E8JG0IJ20120816
[14] See: http://www.bloomberg.com/news/2012-08-15/cisco-beats-estimates-as-price-cuts-lure-more-customers.html
[15] See: http://www.bloomberg.com/news/2012-08-16/u-s-stock-index-futures-little-changed-before-house-data.html

Demand."[16] Falling yen could be negative news for many investors if they continued to bet on the strong Japanese currency, but at the same time, stocks gaining is good news for many others concentrating their attention on indices and company investment. Therefore, both pieces of information would cancel each other out, leading to the formation of neutral frames. By recognizing the existence of positive, negative, and neutral framing elements and by detecting their patterns in the news, we can even more easily measure the effects these frames have on the audience. At the same, we can see that, despite their short form, these frames can be potentially very powerful.

At the same time, I believe that one piece of news, independent of its relevance and importance, is not enough to create a long lasting framing event. A long lasting effect can only be created when similarly framed news reaches the audience repeatedly and with high frequency. In such a case, the framing effect is cumulative and increases over time. This makes the mediatization process stronger over the time.

In order to quantitatively measure framing effects, I utilize a method of dictionary-based quantitative content analysis. In such a case, text is not observed separately but news texts are collected and gathered in one single database. The entire "population" of news texts is seen as one big framing database, which can be accessed when needed, and from which the framing sentiment can be extracted anytime. I believe that at the moment of this writing, this database content analysis method, as I call it, has many advantages over other methods. One of the biggest advantages is the high reliability of the measurements. In my opinion, machine learning and other natural language processing technologies are far less developed methods of quantitative text analysis than the database method, which, according to the research delivers highly reliable results independent of the field where it is used. That is not the case for machine learning methodologies, where algorithms must be heavily trained in order to achieve acceptable reliability levels.

Details of the database content analysis method are described in the following chapters. In this place, I have to note additionally that the methodology I apply in this research seeks to develop new ways of news processing. This new way of news processing is based on the assumption that the speed of information diffusion plays a most important role in modern

[16] See: http://www.bloomberg.com/news/2012-08-15/dollar-near-one-month-high-before-u-s-housing-data.html

times, and that old ways of news processing do not deliver results which would allow us to successfully manage information flow. Nowadays, it is not enough to know; it is even more important to know as soon as possible and as much as possible. Humans have no ability to cope with this requirements adequately. Therefore, machine support for managing and understanding the surrounding reality is non-negotiable. This thesis should not only contribute to understanding the role news diffusion speed plays in increasing the effects of news over society, but at the same time offer practical new ways of processing news quickly and efficiently.

3.2.1 Developing a Computer Assisted Linguistic Forecasting Methodology

One of the major aims of the study was the development of a computer program tool called Calfor to compare financial market decisions with quantitative linguistic analysis of news texts. Calfor performed processing of texts drawing from linguistics, statistics, psychology, media research, and finance. Calfor stands for Computer Assisted Linguistic Forecasting.

Calfor is able to identify automatically and within milliseconds relevant news texts anywhere on the worldwide web or in user-defined sources, like Bloomberg, Thomson Reuters, CNBC etc. It judges automatically and within milliseconds the level of importance of each identified news text, records automatically, and within milliseconds the content of the news text, for instance, whether the text contains positive or negative news on the financial solvency of the Irish government.

Calfor can easily be integrated into existing trading systems or trading models to reduce forecasting errors; it can be used as an independent ready-to-start trading system, or be delivered as a full-featured and fully functional software to perform customized analysis, or used for macro as well as for high frequency trading. Calfor is the most complex and sophisticated instrument for automatic analysis of news texts ever developed.

Calfor identifies concepts which consist of more than one word and rates them as one. In the above sentence, Calfor does not value the words “slow” and “down” separately but values the concept “slow down.”

Calfor attaches a positive (or negative or neutral) value to each word with a positive (negative, neutral) connotation. Unlike standard programs, Calfor weights each word differently according to contemporary experiments on how human beings value different written or verbal symbols. In the above sentence, “slow down” gets a value of -0.39. In contrast, in the sentence, “Market experts fear that the economy will crash over the medium run,” the word “crash” gets value of -0.90, which is substantially lower than the value of “slow down.”

Let us consider the following sentence:

“Investors think that the government’s efforts to support the economic recovery are in vain.”

A standard analysis would not be able to capture the negative meaning of this sentence. It will yield an overall score of +1 resulting from the sum of +1 for “support,” +1 for “recovery,” -1 for “vain, 0 for all other words in the sentence.

On the contrary, Calfor understands that “the government efforts to support the economic recovery” are “in vain” according to “investors,” and attaches a negative value to the whole sentence.

Imagine we are interested in the question of whether the yen will rise or fall in the future. The following sentence is taken from a news text on Bloomberg, October 4, 2010:

“’Any attempt to drive the yen lower with intervention is unlikely to succeed unless it is backed up with much more aggressive easing measures from the Bank of Japan,’ says Shaun Osborne, 47, chief currency strategist at TD Securities Inc. in Toronto.”

A standard analysis will not be able to capture the conditionality in the sentence. It will attribute a score of -1 to the sentence, resulting from -1 for “lower,” -1 for “unlikely,” +1 for “success” and 0 for all other words.

In contrast, Calfor understands that any attempt to “drive the yen lower is unlikely to succeed” unless the Bank of Japan changes its current policy. Accordingly, Calfor overrides the negative valuation of “lower” and attaches a score of zero to the sentence.

Moreover, Calfor is able to discriminate between statements about the past, the present, and the future, discriminate between different forms of emotions in a text, like doubt and confidence among many others, and identify more than 100 additional categories in a text.

Calfor attempts to simulate human text processing. According to communication research, human perception of verbal or written information is based on frames. Generally, a complex text consists of five major types of frames: attributes, problem definitions, judgments, interpretations, and solution suggestions. Human readers intuitively detect the frames in a text and process the text accordingly. Likewise, Calfor identifies the frames in a text and takes them as a basis for analyzing the information content of the text. Research shows that the more complex the framing of a text, the more attention human readers pay to the text. Likewise, Calfor judges the importance of a text according to the complexity of its frames. Importantly what a human reader can do within minutes or hours, Calfor can do within milliseconds.

Calfor does not only simulate human text processing; our tests have shown that Calfor delivers similar results as human content analysts. For instance, during the period March to August of 2010, Calfor and an experienced human content analyst rated 120 news texts on the U.S. business outlook according to the media. The more positive a news text was about the business outlook the higher its score on a scale from -5 to +5. The correlation coefficient between the scoring by the human analyst and the Calfor score was 0.82. Notably, Calfor did the scoring within milliseconds, whereas the human content analyst needed about 2.5 hours per text.

The codebook which has been developed for the purposes of this study is mainly based on the linguistic research of James W. Pennebaker.

3.2.2 Data from the First Generation Media Systems

During the first stage, data (that is newspaper, magazine, and web page articles) were collected using the LexisNexis search engine. The articles were selected so that the database could include all major world publications, electronic or print. Overall, articles from 461 different publications were collected. In the phase of title selection, the research sought to

extend the search horizon to as many titles as possible. Hence, a major criterion of the newspaper title selection was the internationality of the publications (For a detailed list of publications used, please refer to attachment 23).

As my aim was to analyze the impact of the media over all of society, I considered it necessary to collect all economy-related data in all available international publications which have or could have major impact on opinion formation. This data also can be referred as data collected from the first generation news delivery systems.

It can be argued that the *International Herald Tribune* is a publication of a political nature. Using tight selection criteria could lead to the exclusion of the title from publications with major impact on different markets such as the New York Stock Exchange. But I took into the consideration the internationality of the title, its broad impact on opinion formation, and the fact that it has a very large economics section. Hence, I included it in the list of global international publications. Furthermore, it is evident that large amounts of readers form their opinion not only through the general or economic press but also though reading major professional publications in their working fields. Nowadays, literally millions of investors influence markets. Therefore, the era when market price changes were mostly affected by small elites is over. The role of large investors is still very important, but when observing it in the long term perspective, it is evident that this influence is diminishing. Many players whose major activity is not investment are joining the international market and, consequently, affect price change. When selecting titles for the analysis, my paramount interest was in finding global publications with possibly high impact on opinion formation in our global society.

In the second phase of the research, the entire database was split into a day-by-day format. Data was collected from 1998 to 2009. Overall, research produced an articles database covering 11 years. The data included articles from the time of major economic upswings and downturns (such as 1998 and the 2008—2009 crisis). The purpose of the third phase of the data analysis process was data filtering. It was a necessary step for sorting out data that was irrelevant to the research and could be part of database due to broad search terms used for data collection in LexisNexis. Additionally, filtered data was split into segments. Data segmentation was an important part of the research as it allowed me to minimize possible

irregularities between large and small sized articles. After the filtering and segmentation process was finished, over 50,000 articles with 67,300 segments remained in the database. Category building, using SPSS Content Analysis Calfor and NVivo followed the filtering process. Categories related to the U.S. Economy were built in order to detect whether the articles in consideration were truly related to the economic topic. Above 200 economic categories were produced (for detailed information about the economic categories, please refer to attachment 23 at the end of this thesis). All articles in question had to include at least two out of 200 categories in order to fully qualify as a valid entity. Articles with one category were given smaller weight in overall impact measurement. As an example: in order for article to qualify as a valid entry, it was not enough for it to have the keywords U.S. Economy in it. It was necessary for the article to be a valid part of one of the categories listed in attachment 23. For instance, it would have to be "U.S. economy" plus the category "diversified investment." To qualify for inclusion as a full weighted entry articles needed to fit into at least for two categories. For instance: "U.S. Economy + the category "diversified investment" plus the second category "home health care."

The next and final phase of the research was a linguistic analysis of words within articles. At the end of this phase, the applied method delivered the final results and determined the frames we have to deal with. Articles were grouped into three framing categories. The first category included articles with a positive framing slope, the second with a negative one and the third with a neutral slope. As various researchers have found before, the emotions of people highly correlate with the words they use in their oral or written communication (Pennebaker, 2007). As noted above, when using methods of linguistic analysis, three different categories were built. The dictionary words with positive meanings included 415 words and their subsequent relations. An example of positive words used in the dictionary could be "good," "sweet," "love," etc. The dictionary with negative meanings included 537 words. Examples would be words like "hurt", "bad," or "nasty." In the subsequent step, inclusive and exclusive relations between words were determined. An example of an inclusive relation would be "very good" or "certainly positive." A very simple example of an exclusive relation would be "not so good." As stated above, we attribute positive meaning to the word "good," but because of exclusive relation established between "not" and "good" we have a negative statement in this case. Exclusive statements were twofold: In first

category the exclusive relation would diminish the positive or negative meaning of the word to the neutral. In the second case, it would turn the positive meaning to the negative and the negative to the positive. In the next step, a numerical meaning was given to all words and word combinations. Subsequently, words and word combinations produced an aggregated sum. Neutral texts would receive an overall 0 rating, whereas mostly positive word combinations in a text would have a minimum of 0.01 (weak) and a maximum of 5 (very strong) points. Contrary to this, negative word combinations in a text would have a maximum of -0.01 (weak) and a minimum of -5 points (very strong). This final measurement was performed using Calfor. Calfor dealt with the filtered text saved on the server side. The final step was fully automated. The data was collected and interpreted automatically by the developed application. With this step, the analysis of the data collected from the first generation of media systems was completed automatically; generated time series variables were ready for later statistical analysis.

3.2.3 Data from Second Generation Media Systems

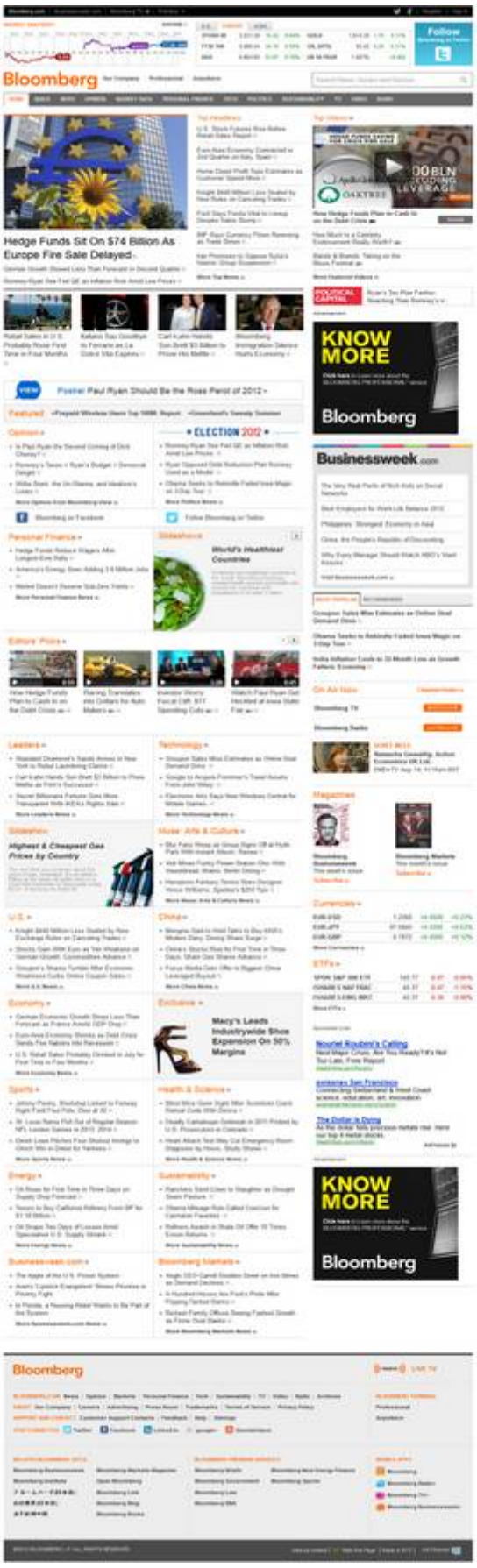
In order to answer all the research questions and test all the hypotheses, I needed samples from all generations of media systems. After finishing the collection of the data from the first generation media systems, my research concentrated on the development of the tool for the analysis of second generation media systems. There I pursued two major aims: first, to find the second generation media outlets which would play a major role for investors and second, to find a way to collect the sample data which would be representative for the second generation media systems. Accomplishing the first goal was not as difficult as reaching the second one.

There are only several major sources of information for both generations of media systems. These sources are mainly large news agencies, the ones that deliver all kind of information, and among them are also the financial information and news agencies which concentrate their attention mainly on financial information gathering and delivery to large and small investors.

After long consideration, I decided to select these two representatives of the second generation media systems: 1. Reuters and its online platform reuter.com 2. Bloomberg and its online platform Bloomberg.com.

At the moment of this writing, the sites were not ranked as first or second in the Alexa ranking of the top news sites. Accordingly, one may wonder why I chose the sites which were ranked only 14th and 21st, respectively and did not favor sites ranked first (Yahoo News) and second (CNN Interactive) on the same rating website. There are many reasons why I did not take the first two. Three reasons are the most important: 1. Both the first and second ranked sites are sites of general news delivery. They have large site sections relevant to financial news but political and other kinds of breaking news play a more important role. To answer my research questions, I needed the most relevant financial sources. 2. My research and experience shows that although Yahoo and CNN are major news source for the general public, the news delivered from these sources are not the primary choice of the professional investors. 3. Both Yahoo news and CNN are not providers of the third generation applications. Accordingly, choosing them would not allow me to directly compare data from the second generation news delivery systems to the third generation news delivery systems. Consequently, there were three major reasons why I decided to pick up Reuters and Bloomberg news as the data source for the second generation media systems news: 1. Both sources are the largest news agencies delivering all kind of news and breaking news, having a major emphasizes on political, social and cultural news but having also very strong units which process and deliver very important financial news. If one is looking for relevant financial or business information, the Reuters and Bloomberg news agencies are the first choices. 2. BothReuters and Bloomberg agencies fall short in popularity among the general public compared to, say, Yahoo News, CNN interactive, or Google News, but they are the primary source of information for investors, market analysts, and professional journalists. 3. Both agencies have a vertical structure which stretches over all generations of news delivery systems. That is, they offer products of the first, second, and third generation news delivery systems and are major players in all three of them. The first generation media systems sample described above, for instance, are heavily loaded with data from both news sources. I would have the ability to collect the data from the comparative third generation media

Graph 16: Reuters.com - front page



Graph 17: Bloomberg.com - Front Page

systems of the same sources. Hence, all samples collected from all generations of media systems would be vertically comparative.

The problem of the second generation media systems, compared to the first generation media systems, is that it lacks a comprehensive archive. Its content is rich and dynamic, and texts are coming and disappearing in an incredibly quick manner. Using the online archives to find relevant information from second generation media systems is very risky and scientifically unjustified for many reasons. The major reason why researchers should shy away from working with online archives is the fact that there are none which are sophisticated enough for academic research. Although there are notable attempts to create "web archives"[17] the methodology behind this work is not well developed. The archiving intervals of the websites in question lack the reasonable crawling interval, the archives do not go far enough back in time to allow researchers to extract enough data from the web pages. Additionally, many elements of the archived web pages simply got lost, and there is no possibility to be sure that a researcher gets all the website components relevant to the study. In this case, I needed the generation of a large amount of the time series sentiment data for at least one year time period for the maximal possible sample available on a minute basis. No web archive currently on the web provides such data at the moment of this writing. Therefore, using the same methodology which I used for working with the first generation media systems, in which very well developed online archives are available was impossible.

Resorting to crawling and web scrapping methodologies seemed to be only reasonable way to go about data collection and automation. However, using these methodologies, researchers face huge problems. Development of the scrapers and crawlers are one of the major problems, but even if we manage to develop good quality web content extraction tools, we will lack enough server capacity and financial resources to process the amount of data or information available on the web. Therefore, further narrowing of the research scope is necessary. Also in the case of this study, it was nearly impossible to scrape the information out of the web pages of the Reuters and Bloomberg sources, as they are nearly endless. Therefore, I made the decision to concentrate only on financial information and only on industries within the huge financial market. My choice in this case was the Foreign

[17] Consider http://archive.org/web/web.php project, for instance

Exchange Market and the currency pair Euro versus the US Dollar which is the most heavily traded product on the market. Some explanations are needed why I decided to concentrate exactly on this industry and only on the product to which I will sometimes refer as EUR/USD.

Narrowing the research scope was necessary in order to reduce the amount of units which had to be analyzed. In our case, this would be the complex structure of websites which would pose huge problems for the project. But one should be careful with narrowing the scope because it poses the danger that the reduction of research units will reduce the amount of data which we can extract from the web and we will fail to generate reasonable amounts of time series sentiment data out of it. Therefore, despite the narrowing of research units, the research scope should remain broad enough to provide sufficient data. In my opinion, it would be a mistake to choose, say, automobile industry news as the analysis unit and hope to generate enough data from the Bloomberg and Reuters news pages in order to gauge reasonable minute by minute sentiments. The choice of the Foreign Exchange Market is based on this logic. Although it is only one sector of the entire financial industry, its volume and importance is so great that it would be able to generate enough news on a daily basis for minute by minute sentiment formation. The Foreign Exchange Market is the single largest industry within the financial markets, with about 4 trillion US Dollar transactions on daily basis[18]. As said, with this volume, the Foreign Exchange Market is the single largest market worldwide. Further, the unique characteristics of being geographically dispersed and a centralized trading floor recommended it. News generation around this market takes place twenty four hours a day. Despite its specialized form, it is affected by nearly all major economic data, news, and announcements and the same developments on the market directly affect the entire global economy and its all facets without exception. Because of this reason, narrowing the scope from the global financial markets to the Foreign Exchange Market is not enough, because for a single study written by only one researcher the information volume still remains unmanageably high. Therefore, it was my decision to concentrate on only one single product among many. This product would be the Euro/US Dollar trading pair. The US Dollar is the most traded (read the most exchanged) product on the Foreign Exchange Market followed by the Euro. So, the trading pair Euro versus US Dollar is responsible for the biggest trading volume there. One may say that, in this case, the

[18] For more information please refer to: http://au.ibtimes.com/articles/110821/20110210/what-is-foreign-exchange-currency-conversion-financial-markets-forex-foreign-exchange-markets.htm#.UCo8Az3iZNM

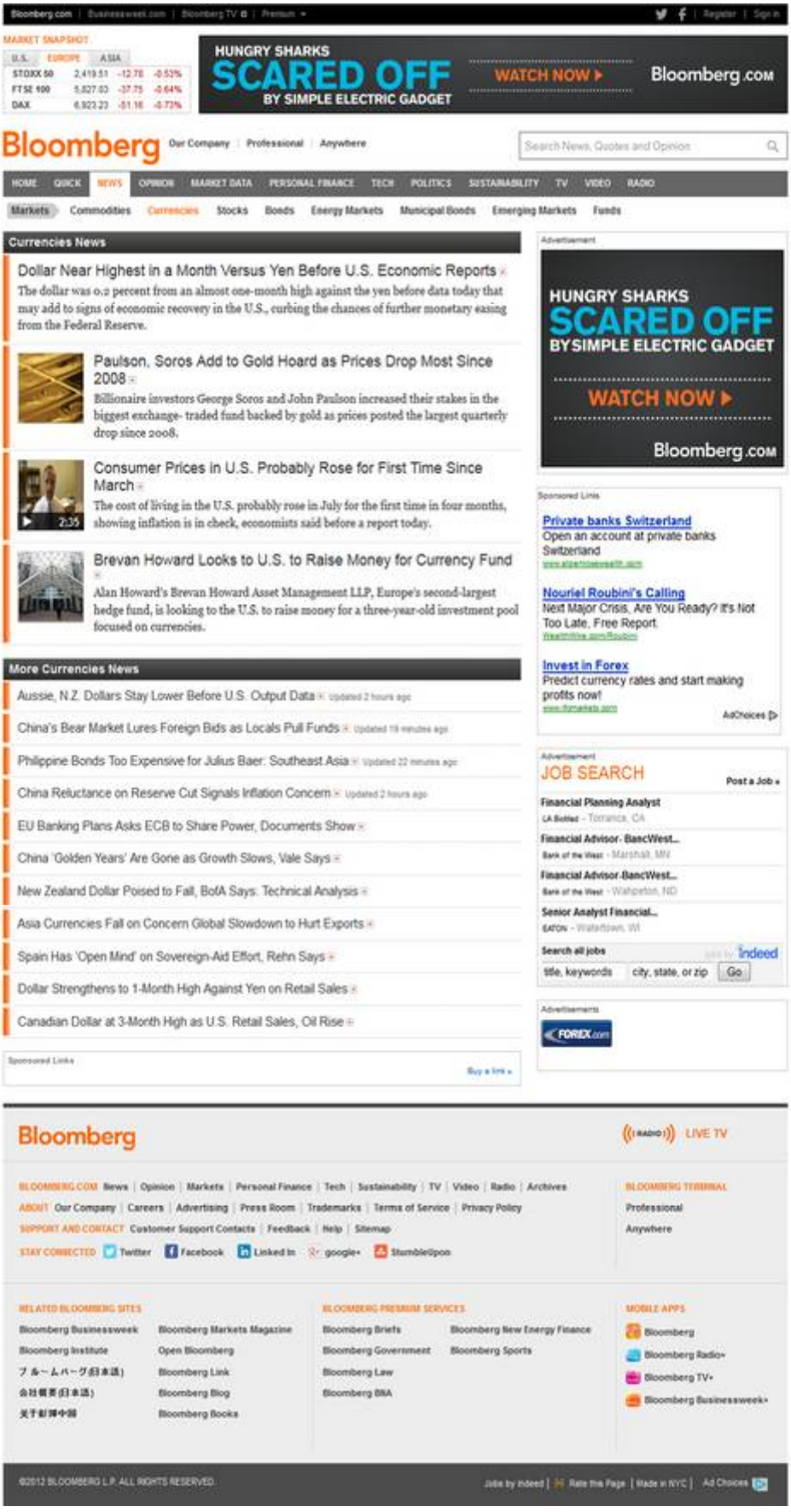
information volume on the currency pair still remains too high. In my opinion, for the methods which I use (that is, fully automated content analysis and then subsequent time series analysis) the information volume on both second generation news systems was exactly right. My study shows that an average information flow on both websites regarding the Euro/US Dollar trading pair varies between two to five news items in every ten-minute time span. The information inflow significantly decreases during Tokyo Business hours and reaches its highest level during London market trading times. Choosing another, less traded pair, such as the Euro/Great Britain pair would lead to too low an information inflow and would not be sufficient for minute sentiment formation. Two to ten news items in every ten-minute time span provides optimal settings for minute sentiment formation. If I had large servers, a very fast Internet connection, and a super computer, then analysis of the entire Foreign Exchange Market would not be a problem, and we would be able to trace market sentiment even better. When I am speaking about the optimal settings, it should be noted that the settings are optimal when taking in account the limitations of my Internet connection, of my server and of my processor computing capacity.

United States	United States Dollar	USD	$	84.9
European Union	Euro	EUR	€	39.1
Japan	Japanese Yen	JPY	¥	19
United Kingdom	Pound Sterrling	GBP	£	12.9
Australia	Australian Dollar	AUD	$	7.6
Switzerland	Swiss Frank	CHF	Fr	6.4
Canada	Canadian Dollar	CAD	$	5.3
Hong Kong	Hong Kong Dollar	HKD	$	2.4
Sweden	swedish Krona	SEK	kr	2.2
New Zealand	New Zealand Dollar	NZD	$	1.6
South Korea	South Korean Won	KRW	₩	1.5
Singapore	Singapore Dollar	SGD	$	1.4
Norway	Norwegian Krone	NOK	kr	1.3
Mexico	Mexican Peso	MXN	$	1.3
India	Indian Rupee	INR	INR	0.9

Graph 18: The World's Most Traded Currencies

Coming down to only one currency pair on the Foreign Exchange Market would require me to limit my examining units of both second generation news delivery systems sources. It would not make much sense to examine the entire Reuters and Bloomberg platforms when looking only at a certain product. Accordingly, the concentration on the currency sections of

Graph 19: A Look at the Reuters Currency Section Page

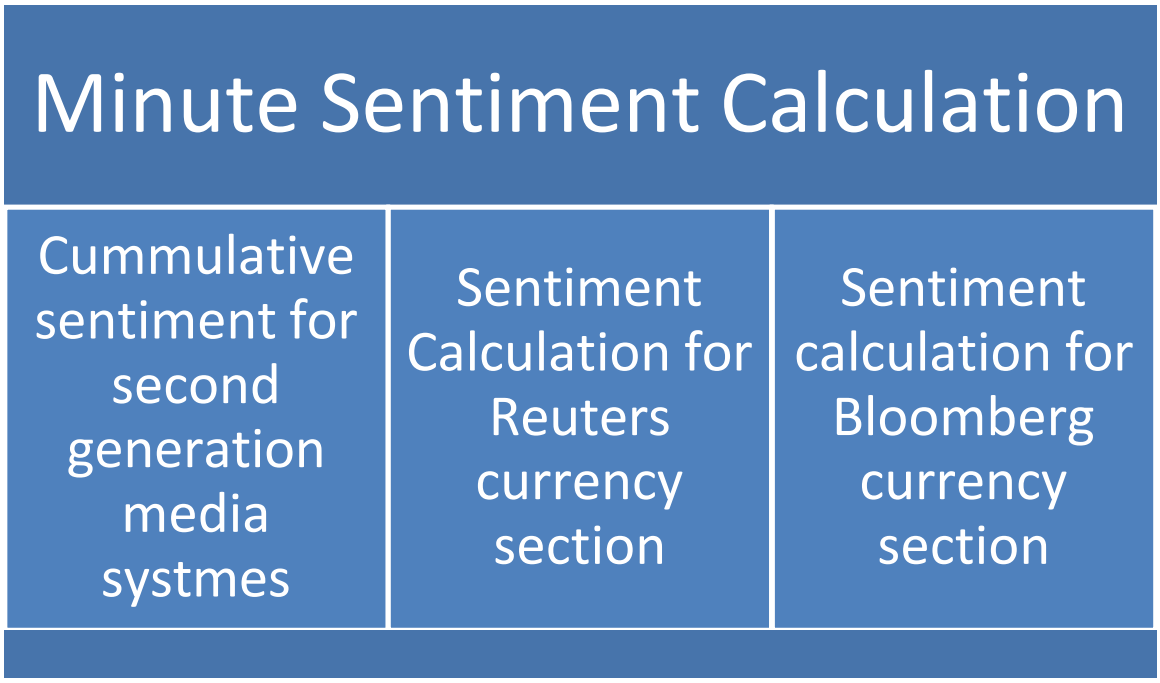


Graph 20: A Look at the Bloomberg Currency Section Page

both websites was an obvious choice. Choosing the currency sections of these outlets had the advantage that there were no complicated filtering steps required for information processing as with the first generation news delivery systems. This pre-work was already done for me by the Reuters and Bloomberg correspondents, and one could be absolutely sure that all information coming on the website was relevant for the world currency sector.

The next step in the data gathering process was the development of crawling and scraping technologies which would suit my research needs; and the second next step was the integration of the technologies into the Calfor. At the final stage of the program development, the Calfor was able to automatically crawl both platforms' section sites on a minute by minute basis and look on them for the relevant information. If the information was found, Calfor was scraping the content of the news and saving it on the server. For a search of the relevant information, the development of simple keywords was enough.

I simply needed a set of keywords which would allow me to find information directly related either to the Euro or the US Dollar. Accordingly, the keywords were simple: on the one hand, we had "Euro" as the single keyword for searching for Euro-related information. On the other hand, we had "Dollar" as the keyword, but the Dollar part of the search was somewhat trickier than the Euro. Worldwide, there is only one currency which has the name Euro. Accordingly, searching for information about the Euro gives us only the information related to that currency. This is not the case for the word "Dollar." We have not only the US Dollar but also the not-as-heavily-traded but still very popular currency of the Australian Dollar. Therefore, searching only for the keyword "dollar" would distract the data as we would archive and analyze not only US Dollar related news but also Australian Dollar related news. Therefore, during the programming process, I defined also exclusion criteria which would allow for searching for US Dollar but not the Australian Dollar information results. Defining such exclusion criteria is not especially difficult as such simple exclusion technologies have been available for more than a decade as a programming tool.



Graph 21: Sentiment Calculation

After the development of the crawling and scraping technology, Calfor was testing for news Sentiment on both web platforms from the April 1, 2011 to January 6, 2011. Minute by minute sentiment data was collected and more than 38.000 sentiment observations were created. All articles analyzed for sentiment were archived for the future tests. With this, the creation of a sentiment database for second generation media systems was over. Overall, the sentiment was built for both media outlets as the cumulative value. That is, sentiment was calculated on the basis of all articles found on all platforms. Separately, sentiment was calculated also for Reuters and Bloomberg as independent platforms. With this, I wanted to test whether news sentiment from both second generation news delivery platforms had some kind of influence on the market and whether the companies taken separately have impact on the market.

3.2.4 Data from Third Generation Media Systems

The next step in creating the research databases was the sample collection from the third generation media systems. In this case direct work with the platforms offered by the third generation news delivery companies was required. There are not many such companies, and the choice is significantly limited compared to the second generation news delivery service

providers. Generally, there are two major players on the market: first is the Bloomberg company with its product Bloomberg Terminal, and second is the Reuters with the product named Reuters Xtra 3000. Both products were discussed in detail in Chapter 2.5.

When I was working on the empirical part of the research, I was unable to gain long term access to the Bloomberg terminal. My observations of news from the service was, therefore, only anecdotal. During the research phase, it was possible to get long term access to the Reuters xtra 3000 platform, where I collected the relevant news from the application. Unlike the second generation media systems, here it was possible to work with the Reuters archive as the platform provided a very sophisticated news search tool and a very well-developed archive in the form of the news database. Also in this case, complicated filtering procedures were not required, as Reuters Xtra 3000 offered a very good system of news categorization, and I was able to filter relevant news using the platform itself. Like the second database, here too the market I was concentrating my attention on was the Foreign Exchange and the pair traded on the market, the Euro versus the US Dollar.

The Euro related news and the US Dollar related news were searched for here separately, and the sentiment of each news item was detected. Unlike the second generation news delivery platforms, here I decided to build the daily average sentiment and not the minute by minute sentiment. This was due to the fact that the Reuters Xtra 3000 archive did not keep not all the incoming information on the currency pair but only kept news with higher impact. Therefore, the frequency of news arrival was not as high as in the second generation news delivery systems database. In such a case, the formulation of the daily average sentiment was a better choice. After detecting the sentiment for each news item, the average daily sentiment was generated. The generation of average sentiment data was a fairly easy process. The average sentiment was the sum of all news sentiment divided by the total number of the news items gathered during the day.

At the end of sample collection, the created Euro/US Dollar news database contained the average daily news sentiment from January 1, 2010 to March 12, 2010. This was the maximum possible range for news collection for the Reuters Xtra 3000. At the same, the sample collected was more than enough for the consequent statistical tests.

3.3 The Model of Granger Causality

In my thesis, I am using a statistical method designed for detecting causality. This might sound very easy to do but in statistical terms, designing or finding such a model is very challenging. To find the method, I turned my attention to regressional or auto-regressional models which, as we already saw in the literature review above, are commonly used for observing whether one variable has an impact on other and whether this impact is causal and of statistical significance. During all the tests, we will actually deal with only two variables. The first variable will be media sentiment, and the second variable will be the price. Media sentiment will represent the mood of different media outlets in different tests ,and price will be of different indices but in the model, these two variables will remain constant.

For detecting causality, I will be utilizing the auto regressive statistical method which is referred to as the Granger causality test as it was developed by the researcher Clive Granger. Below is the largest citation in this thesis. Clive Granger can best describe the method he introduced (Granger 2001):

> *The topic of how to define causality has kept philosophers busy for over two thousand years and has yet to be resolved. It is a deep convoluted question with many possible answers which do not satisfy everyone, and yet it remains of some importance. Investigators would like to think that they have found a "cause", which is a deep fundamental relationship and possibly potentially useful.*
>
> *In the early 1960's I was considering a pair of related stochastic processes which were clearly inter-related and I wanted to know if this relationship could be broken down into a pair of one way relationships. It was suggested to me to look at a definition of causality proposed by a very famous mathematician, Norbert Weiner, so I adapted this definition (Wiener 1956) into a practical form and discussed it.*
>
> *Applied economists found the definition understandable and useable and applications of it started to appear. However, several writers stated that "of course, this is not real causality, it is only Granger causality." Thus, from the*

beginning, applications used this term to distinguish it from other possible definitions.

The basic "Granger Causality" definition is quite simple. Suppose that we have three terms, X_t, Y_t, *and* W_t, *and that we first attempt to forecast* X_{t+1} *using past terms of* X_t *and* W_t. *We then try to forecast* X_{t+1} *using past terms of* X_t, Y_t, *and* W_t. *If the second forecast is found to be more successful, according to standard cost functions, then the past of* Y *appears to contain information helping in forecasting* X_{t+1} *that is not in past* X_t *or* W_t. *In particular,* W_t *could be a vector of possible explanatory variables. Thus,* Y_t *would "Granger cause"* X_{t+1} *if (a)* Y_t *occurs before* X_{t+1}; *and (b) it contains information useful in forecasting* X_{t+1} *that is not found in a group of other appropriate variables.*

Naturally, the larger W_t *is, and the more carefully its contents are selected, the more stringent a criterion* Y_t *is passing. Eventually,* Y_t *might seem to contain unique information about* X_{t+1} *that is not found in other variables which is why the "causality" label is perhaps appropriate.*

The definition leans heavily on the idea that the cause occurs before the effect, which is the basis of most, but not all, causality definitions. Some implications are that it is possible for Y_t *to cause* X_{t+1} *and for* X_t *to cause* Y_{t+1}, *a feedback stochastic system. However, it is not possible for a determinate process, such as an exponential trend, to be a cause or to be caused by another variable.*

It is possible to formulate statistical tests for which I now designate as G-causality, and many are available and are described in some econometric textbooks (see also the following section). The definition has been widely cited and applied because it is pragmatic, easy to understand, and to apply. It is generally agreed that it does not capture all aspects of causality, but enough to be worth considering in an empirical test.

We want to investigate whether “Media Sentiment” influences the “Closing Price” or not. To do this we used the Granger causality test. The following model is used to apply the Granger causality test. It is imprtant to note that when I speak of causality below, I mean Granger causalitty in all the cases. Whether the real causality is given or not, is a matter for further discussions.

Let us denote, Y= Closing Price and X= Media Sentiment. So by the principle of Granger test, if X causes Y, there are two conditions to be satisfied:

1. X can help in predicting Y and regression X on Y has a big R^2
2. Y cannot help in predicting X

3.3.1 First Test: Sentiment Granger Causes Closing Price

First, I would like to see whether media sentiment is able to show causality.

In this case my $H_0 : X \text{ does not cause } Y$. Or equivalently

$H_0 : \beta_1 = \beta_2 = \cdots = \beta_m = 0 \text{ from the following model}$

$Y_t = \sum_{i=1}^{m} \alpha_i Y_{t-i} + \sum_{i=1}^{m} \beta_i X_{t-i} + \epsilon_t$

As a second step we run the following regression, and calculate RSS (full model).

$Y_t = \sum_{i=1}^{m} \alpha_i Y_{t-i} + \sum_{i=1}^{m} \beta_i X_{t-i} + \epsilon_t$

In the third step I run the following limited regression, and calculate RSS (Restricted model).

$Y_t = \sum_{i=1}^{m} \alpha_i Y_{t-i} + \epsilon_t$

As a fourth step I do the following F test using RSS obtained from stages 2 and 3:

F = [{(N-k) /q }.{(RSSrestricted-RSSfull) / RSSfull}]

$F = \frac{N-k}{q} \frac{RSS_{restricted} - RSS_{full}}{RSS_{full}}$

Where N is number of observations; k is number of parameters from full model; q is the number of parameters from the restricted model.

In the fifth step I conclude that if the null hypothesis is rejected then X causes Y

3.3.2 Second Test: Closing Price Granger Causes Sentiment

My model in the case when the Closing price predicts sentiment remains the same as above

In this case my $H_0 : X \text{ does not cause } Y$. Or equivalently

$H_0 : \beta_1 = \beta_2 = \cdots = \beta_m = 0 \text{ from the following model}$

$Y_t = \sum_{i=1}^{m} \alpha_i Y_{t-i} + \sum_{i=1}^{m} \beta_i X_{t-i} + \epsilon_t$

As a second step we run the following regression, and calculate RSS (full model).

$Y_t = \sum_{i=1}^{m} \alpha_i Y_{t-i} + \sum_{i=1}^{m} \beta_i X_{t-i} + \epsilon_t$

In the third step I run the following limited regression, and calculate RSS (Restricted model).

$Y_t = \sum_{i=1}^{m} \alpha_i Y_{t-i} + \epsilon_t$

As the fourth step I do the following F test using RSS obtained from stages 2 and 3:

F = [{(N-k) /q }.{(RSSrestricted-RSSfull) / RSSfull}]

$F = \frac{N-k}{q} \frac{RSS_{restricted} - RSS_{full}}{RSS_{full}}$

Where N is the number of observations; k is the number of parameters from the full model; q is the number of parameters from the restricted model.

In the fifth step I conclude that if the null hypothesis is rejected then X causes Y

To give evidence in support of X causes Y from the first condition the condition-2 must be accepted. That is, the fifth step for this case should be accepted.

Below, we will see the outcomes of the tests which were performed using the above statistical method.

3.3.3 Making Granger Causality Understandable

In this chapter, I have introduced statistical methods which I used in my research for understanding causal relationships between news sentiment and price change. I would like to stress it one more time that my major aim in this research is to understand the influence news sentiment has on market participants. I believe that this "causal" relationship can be best observed by monitoring news sentiment change on the one hand and price reaction to this change on the other.

The method which I have introduced in the above chapter is, admittedly, highly technical and overloaded with mathematical formulas and terms. As such, I think a short description is necessary for the work, which is highly quantitative in its nature and works a lot with numbers. But I also strongly believe that a more informal introduction to the model or the method is also needed, as readers of this research are, most likely, not used to such numerical explanations. When reading the lines below, please note that this is a "translation" of the above mathematical language into normal, sociological terms.

Basically, there are two types of statistical attempts to detect the causal relationship between two variables or phenomena. In most cases, researchers, who are trying to understand true influences of one variable on another, use regression analysis. Additional form of regression analysis are forecasting and time series forecasting.

At first, we have to define the term of time series. The data I use in this research can be considered as time series data. The definition of it is fairly simple. Time series data is data collected for a single entity at multiple points in time. Accordingly, in this database we have two such entities; that is, entities the data of which was collected at multiple points in time. First, it is news sentiment and second it is price. The empirical part of this thesis deals only

with these two variables. Hence, we actually have only two variables everywhere in this study. A variable Y is in this case always the price, and variable X is news sentiment (this then simply reverses in the Granger causality test). Accordingly, our basic interest throughout the entire research is fairly simple to formulate. We would like to know what is the causal effect of one variable of interest, which is Y, of a change in another variable, which is X, over time. To put it in even simpler terms, we attempt to understand what happens with variable Y or how it does change when variable X has changed. And to translate all this into understandable human language, we would like to know how the price changes when news sentiment changes. Here, it is of crucial importance to note that we do not really attempt to find out whether the sentiment change truly causes the price change. We barely try to understand whether the sentiment change is followed by the price change. Therefore, the true question we attempt to answer here is: "Is sentiment change a good forecaster of future price change or price action?"

At this point, we come to the very important distinction between a true causal relationship and a causal relationship which in reality might not have any relationship with each other but which still can be used for reasonable prediction of the change in variable Y. For many readers the above can sound like nonsense. Therefore, we may need some simple examples:

As an example, let us assume that we have two different phenomena to observe. First are clouds and second is rain. In this case we would like to know whether clouds and rain have some causal relationship. By observation, we could easily find out that in lot of cases a high concentration of clouds can cause rain. This could lead to the assumption that rain is caused by the high concentration of clouds in the atmosphere. Does it mean that there is a causal relationship between the two phenomena? Yes, probably it does. But in order to find this out, we need to perform certain statistical tests. For that purpose we could use a standard OLS[19] regression. Let us get back to these statistical tests later. At this point, I suggest moving to the next example.

In the second example, let us assume that the first phenomenon is the rain and second is the weather forecast on some broadcasting channel. We would like to find out whether we can use the news broadcast to forecast rain. This we could use for our own purposes. We could,

[19] OLS stands for Ordinary Least Square regression. This method of regression analysis is widely used in statistical research.

for instance, make a decision whether we will need an umbrella when we go out shopping this evening. When the weather forecast is fairly good (and in our times they are mostly good), then we can easily detect that this tool can be used for forecasting a rainy day. But does it mean that the weather forecast causes rain? Of course, it does not. That is, by observing one phenomenon we could explain and forecast another, but this does not really mean that there is any causal relationship between the two. Also, to prove this in a scientific way, we would need some statistical test.

At this stage, we have to turn our attention to the test, but at the same time we should bear in mind the examples above. At first, we need to return to our important point of difference between true causal relationships and relationships which do not really cause each other but yet explain each other. Now, it is important to note that we could have these possible variations:

1. Phenomena which cause each other but cannot be used for any reasonable forecasting.
2. Phenomena which can be used to explain each other but which do not have any causal relationship in statistical terms.
3. The phenomena which cause each other and can be used to forecast each other.

In is necessary to note that it is beyond the capacities of 95 percent of researchers to answer all the above questions in a single study, and I am among them. Therefore, the scope of the research has to be narrowed. The challenge is that answering all these questions needs different statistical tests. In order to answer the first question formulated above we need another type of regression study, and in order to answer the second question we need some other formula. The answer on the third question is provided when the first and second questions are answered in the first instance and when we perform some additional test to confirm our findings. That is, a researcher has the possibility to answer questions 1 and 2 independent of each other, but the answer to the third question can only be provided when we know the solution to the first and second puzzles. I would like to return to our examples once again so that my points are clear: by knowing that a high concentration of clouds in most of cases causes rain doesn't help us to properly forecast rain because many times when we notice such a change in the atmosphere, it is already too late to return back home

and pick up an umbrella. Watching the weather news in the morning before going out could help us in this case but by knowing from news channel that is going to rain in several hours' time does not really explain to us why this rain is going to happen. In most cases, such knowledge is absolutely unnecessary in our everyday lives. Importantly, we can use the knowledge received from the weather forecast to plan our day. That is to decide whether we should take an umbrella with us or wear something waterproof.

In the case of our study, we are dealing with a causal explanation which is actually not causal. That is, even if we find out that news sentiment change affects price change, we cannot really argue that this change in price happened due to news sentiment change. Hence, we cannot say whether there is a true causal relationship. We simply will know that due to some reason, we can use news sentiment for "predicting" price action. For this research, this knowledge is crucial. We have to bear in mind that we are trying to observe the mediatization phenomenon. The evidence that news sentiment can predict price change is critical.

As was said above, the research deals with only two variables and performs two F-Tests for both. In the first test, Y, which is the dependent variable, stands for price action and X, which is the independent or explanatory variable, stands for news sentiment. In the second test, the opposite is the case. That is, Y stands for news sentiment, and X stands for price change. To make all that even more complicated (before I explain all that was said and show how at the end, it is not so complicated) I have to bring one more term: both dependent and indented variables have lags. In this research, we always will use three lags in the model. Next, we have to look at the F-Test, first, and the second test and lags terms in details.

As said, what we do in this research is to perform the F-Test. One might wonder what the F-Test stands for. The letter F does not stand for anything mathematical at all. The term was introduced by the statistician G. W. Snedecor, in honour of Sir R. A. Fisher (Fisher, hence F), who initially developed the statistic as the variance ratio. It will take us too long to go into the details of F-test. It is important to note that in Granger causality, after performing the test, an increase in the value of F indicates an independent variable can "significantly" explain the change in the dependent variable. For interpretations of the tables in this research, suffice to say when the F value in the dependent variable goes up, it is significantly

influenced by the independent variable. When the F value remains low, then there was no significant explanatory power to observe.

The first test and second test are, in theoretical terms, absolutely identical. In the second test, the dependent variable changes place with the independent variable. That is, in the first test the independent variable is news sentiment, and we look at the F value. In the second test, the independent variable is price change, and we look at the F value. Therefore:

If in first test the F value goes up, we can say that news sentiment can be used for predicting future price changes. If it remains unchanged, then we can say that our null hypothesis is confirmed, and news sentiment does not Granger-cause price change. The same is true for the second test, but here we say that price action does not Granger-cause news sentiment. As the final note: when in both tests, the F value goes up, we say that there is no Granger-causality to observe.

The term "lags" remains to be explained. Lags, simply speaking, are the past values of the same variable in a time series. Often this is referred to as autocorrelation. Let us say that we have some price at a given time. As an example, we have a Dow Jones Industrial Average value of 5500 on 13.02.2007[20] and that on December 12, 2007 the price of the same product was 5878. Then, the last value, which is 5878, will be the first lag of first value, which is 5500. In this research, we use three lags for news sentiment as well as for news sentiment all the time. The reader of this study always has three lags to deal with but on different time ranges. That is, sometimes the difference between the lags is 24 hours and sometimes only one minute. This is because we have to deal with three different datasets in this research.

3.4 Business Cycles in the Empirical Research

One of the endemic features of market economies are business cycles. They can be thought of as that extra bit of salt that spoils the pudding. Prosperous long term growth has been enjoyed by all the major industrialized market economies of the world, for decades or even

[20] There was no such price on the date, this is only authors imagination and can be used only for explanatory purposes. If you still will find out, that on 13.02.2007 the closing price of the Dow Jones Industrial Average was indeed 5500, this would be a great coincidence, much like winning the Euromillion or some other lottery.

centuries. As the Industrial Revolution and the start of the machine age began in Europe, in the early 19th century, industrial production (measured per person or per capita) started a continual rise which increased living standards and then introduced first the promise of, then the reality of prosperity and economic security for larger and larger numbers of people.

Just looking at short time periods, economic development seems to be random and unpredictable. If inter-generational trends are observed and investigated, the year by year changes leading to long range progressive trends can be seen as erratic short-run events in which a disturbing pattern emerges. There is a pattern of occasional boom and bust underlying prosperous growth. Every so often there will be long years of economic depression which affects whole generations and shapes political events. An unforgettable memory of hardship was left by the decade-long Great Depression. At other times there can be periods of high inflation which erode purchasing power and undermine the financial markets by inequitably redistributing wealth and income. In less serious periods, unrealistic expectations can develop which lead to disappointment when unemployment, business failure, lost income, problems with debt, and other effects of recession are felt.

The business cycle is built on this variability in an otherwise healthy long-running trend. The business cycle is a problem which is chronic and endemic, at least for the industrialized nations, and the study of it involves the study of the most persistent problem afflicting mature market economies.

In this text, the view point that the business cycle is an occasional minor embarrassment to an otherwise relentless and orderly drive to prosperity is not taken. Instead the cycle and its negative elements (recession, inflation, and even depression) are features of a system that works but is afflicted by problems that are consistently recurring, and these reflect defects in the actual structure of the system. Wherever you find an industrialized market economy, you will also find business cycles.

Before going any further, it would be helpful to construct a rough image with which to describe business cycles. This can be done by describing the pathology of a business cycle. This medical term, which identifies that characteristics and patterns of diseases, is being borrowed for our purposes here. There are certain important features that most business

cycles have in common as well as important unique features. A general and detectable pattern is generally exhibited; this is the pathology of the cycle.

By definition the patterns in business cycles are recurring events; a depression can start at any point. In this description the start will be taken as the point where the economy is ready to start to recover from the deepest part of the recession trough.

In the trough, business failure and unemployment rates will be unusually high, inflation will be low (but not always), while production of goods and services have fallen from the previous high. Less is being produced and consumed by the nation compared to when it was more prosperous. Industries which are sensitive to the cycle, such as residential real estate and auto production, are depressed. Business investment and customer borrowing are low. Often interest rates are low and getting still lower, sometimes because the Federal Reserve System is trying to stimulate the economy out of recession. Some benefits emerge despite the recession being harmful. Remaining businesses have cut costs as sales have fallen; while lower interest rates have reduced the burden of debt on borrowers and lowered the effective cost of some items, such as houses and cars, bought with credit. As consumers want to keep their standard of living but have to postpone purchases, pent-up consumer demand continues to grow. Stimulation measures are initiated by federal, state, and local governments, as far as their ability will allow, which is limited in modern times. The Federal Reserve System, the nation's central banking authority, is using aggressive expansionary monetary policy which is designed to increase the amount of credit available and reduce interest rates at this stage of the recession.

The combination of stimulants, which are different for each recession and are described only generally, start to have an effect. Initially the slide stops, and then a slow recovery starts. It is possible there might be a reversal in auto or home sales (as happened in 1982, for example), stabilization of business profits, possibly even at comparatively low levels, or a surge in the stock market (but this can often be a false signal). Also in more recent times, the media coverage will start to improve; this has been glum in the bad times but will change to be hopeful. Some retailers will start to see rises in their sales while the rest will see the decline stop. Consumer confidence, reflecting the feelings of the employed, starts to rise,

often sharply. In the consumer-driven American economy, this last part is vital. No matter how consumers start to spend, economic recovery will follow.

Initially the effects will be uneven. Some regions and industries will grow while others remain stagnant. Unemployment rates might continue to rise, at least for a short time, as those industries still declining lay off workers and recovering industries do not start to hire new employees but rather deplete inventories and use existing employees more efficiently (they might work longer hours, for example) before starting to look for new employees when the recovery is more certain.

Finally, unemployment will start to fall when the recovery is obvious. Corporate profits will usually follow the business cycle and so start to increase as the recovery begins in the economy. On the other hand, corporate investment lags behind, sometimes significantly, and will not increase until well into the recovery. This could be to do with the inherent caution of businesses (investment spending is a big long-term commitment and needs robust future sales to be forecast), but it also has a long planning horizon, so this will need to be worked through before investment is seen. Gradually, the recovery will include more people, as sales grow and rising profits start to be reported across most regions and industries. The growth rate of national production becomes positive, and production is soon at the level it was before the recession or often even higher.

In this study we use OECD system of composite leading indicators (Gyomai, 2008) in order to understand the implications of the business cycle on media news effects. Initially, the system was developed in the 1970s and was aimed at giving early signals of turning points of economic activity. According to its developers, OECD Composite Leading Indicators are constructed to predict cycle reference series chosen as a proxy for economic activity. Hence, fluctuations in economic activity are measured as variations in economic output relative to long term potential. The difference between potential and observed output is referred to as output gap, whereas the fluctuation in the output gap is referred to as business cycle (Gyomai, 2008). Additionally, it must be noted that OECD Composite Leading Indicators are constructed from economic time series that have similar cyclical fluctuations to those of business cycles but which precede those of the business cycle.

For better understanding of above please refer to graph 1 which displays OECD Composite Leading Indicators business cycles from 1999 till 2010. In this chart, the line represents OECD Composite Leading Indicator activity whereas trend line 100 is a long term trend (Gyomai, 2008). Hence, instead of Gross Domestic Product movements which are usually used as a proxy for business cycles, OECD Composite Leading Indicators employs indices of industrial production.

Unlike several other studies introduced in the literature review, we differentiate only two types of economic business activity. The first type of activity is economic upturn and the second is economic downturn. In this research, we are not concerned with the predictive power of the OECD Composite Leading Indicators. Besides its strong predictive characteristics, we believe OECD Composite Leading Indicators is a perfect tool for identifying the current economic situation and past cycles of economic activity. In this research, all values of OECD Composite Leading Indicators above the 100 trend line are considered to be indicators of economic upturn and all values below that same line are considered to be indicators of economic downturn. For the purposes of this study, we use OECD composite Leading Indicators data from 1998 till 2009 for the U.S.A.

In this time period, we identified five business cycles. The first cycle of economic downturn was relatively short and lasted from July till November 1998. Hereupon, from December 2008 till September 2000, a period of economic upturn followed. This positive trend, once again, was interrupted in October 2000. At this date, a long period of economic downturn started. This downturn phase was over only in October 2003. A long phase of economic upturn followed. It can be argued that from November 2003 till June 2008 the economy performed relatively well. This positive trend was interrupted with a strong shock, which can be very well observed on the graph 1 of this article. As we have identified five different business cycles, we have split our media sentiment database into five different parts which perfectly match the identified business cycles.

3.5 Working Hypotheses

In order to use the introduced Granger causality model and analyze the research questions, the establishment of the working hypothesis is indispensable. This chapter will introduce all working hypotheses which will be tested in this research.

I. I establish the following hypothesis for Research Question 1: Does global media sentiment influence market price action (in our case, changes on the Dow Jones Industrial Average - DJIA)?

- **Test 1**: Global media sentiment does not Granger-cause the price change of Dow Jones Industrial average between 1998 and 2009
- **Test 2**: Dow Jones Industrial Average price change does not Granger-cause global media sentiment from 1998 to 2009

II. I set an additional two null hypotheses for research question 1.1: Does positive global media sentiment influence market price action (DJIA) in a stronger manner than negative media sentiment?

- **Test 1:** Positive global media sentiment does not Granger-cause the price change of the Dow Jones Industrial Average between 1998 and 2009
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause positive global media sentiment

III. Two null hypotheses are established also for research question 1.2: Does negative global media sentiment influence market price action (DJIA) in a stronger manner than positive media sentiment?

- **Test 1:** Negative global media sentiment does not Granger-cause the price change of the Dow Jones Industrial Average between 1998 and 2009
- **Test 2:** The Dow Jones Industrial Average price change does not Granger-cause negative global media sentiment between 1998 and 2009

IV. In order to test research question 2: “Can we observe different global media sentiment effects on market price action (DJIA) in different business cycles?” we

need more than two null hypotheses, as for each business we need to establish separate hypotheses. Establishment of hypotheses for testing the price action global media sentiment relationship in Downtrend of 1998 goes:

- **Test 1:** Global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend of 1998.
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause global media sentiment in the downtrend of 1998**.**

V. The establishment of hypotheses for testing the price action global media sentiment relationship during the uptrend from 1998 to 2000:

- **Test 1:** Global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the uptrend from 1998 to 2000
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause global media sentiment in the uptrend from 1998 to 2000

VI. The establishment of hypotheses for testing the price action global media sentiment relationship during the downtrend from 2000 to 2003:

- **Test 1:** Global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend from 2000 to 2003
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause Global media sentiment in the downtrend from 2000 to 2003

VII. The establishment of hypotheses for testing the price action global media sentiment relationship during the uptrend from 2003 to 2008:

- **Test 1:** Global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the uptrend from 2003 to 2008
- **Test 2:** The Dow Jones Industrial Average price change does not Granger-cause Global media sentiment in the uptrend from 2003 to 2008**.**

VIII. The establishment of hypotheses for testing the price action global media sentiment relationship during the downtrend from 2008 to 2009:

- **Test 1:** Global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend from 2008 to 2009
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause global media sentiment in the uptrend from 2008 to 2009

IX. We need a similar amount of working hypotheses for testing research question 2.1: Can we observe different positive global media sentiment effects on market price action (DJIA) in different business cycles? The establishment of hypotheses for testing the price action positive global media sentiment relationship in the downtrend of 1998:

- **Test 1:** Positive global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend of 1998.
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause positive global media sentiment in the downtrend of 1998

X. The establishment of hypotheses for testing the price action positive global media sentiment relationship during the uptrend from 1998 to 2000:

- **Test 1:** Positive global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the uptrend from 1998 to 2000
- **Test 2:** The Dow Jones Industrial Average price change does not Granger-cause positive global media sentiment in the uptrend from 1998 to 2000

XI. The establishment of hypotheses for testing the price action positive global media sentiment relationship during the downtrend from 2000 to 2003:

- **Test 1:** Positive global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend from 2000 to 2003
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause positive global media sentiment in the downtrend from 2000 to 2003**.**

XII. The establishment of hypotheses for testing the price action positive global media sentiment relationship during the uptrend from 2003 to 2008:

- **Test 1:** Positive global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the uptrend from 2003 to 2008
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause positive global media sentiment in the uptrend from 2003 to 2008

XIII. The establishment of hypotheses for testing the price action positive global media sentiment relationship during the downtrend from 2008 to 2009:

- **Test 1:** Positive global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend from 2008 to 2009
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause positive global media sentiment in the uptrend from 2008 to 2009

XIV. We need to repeat the same hypotheses establishment process in order to test research question 2.2: Can we observe different negative global media sentiment effects on market price action (DJIA) in different business cycles? The establishment of hypotheses for testing the price action negative global media sentiment relationship in the downtrend of 1998:

- **Test 1:** Negative global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend of 1998
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause negative global media sentiment in the downtrend of 1998

XV. The establishment of hypotheses for testing the price action negative global media sentiment relationship during the uptrend from 1998 to 2000:

- **Test 1:** Negative global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the uptrend from 1998 to 2000
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause negative global media sentiment in the uptrend from 1998 to 2000

XVI. The establishment of hypotheses for testing the price action negative global media sentiment relationship during the downtrend from 2000 to 2003:

- **Test 1:** Negative global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend from 2000 to 2003
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause negative global media sentiment in the downtrend from 2000 to 2003

XVII. The establishment of hypotheses for testing the price action negative global media sentiment relationship during the uptrend from 2003 to 2008:

- **Test 1:** Negative global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the uptrend from 2003 to 2008
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause negative global media sentiment in the uptrend from 2003 to 2008

XVIII. The establishment of hypotheses for testing the price action negative global media sentiment relationship during the downtrend from 2008 to 2009:

- **Test 1:** Negative global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend from 2008 to 2009
- **Test 2:** The Dow Jones Industrial Average price change does not Granger-cause negative global media sentiment in the uptrend from 2008 to 2009

XIX. In order to answer research question 3: “Does the online financial media content influence price action (EUR/USD exchange rate) to a greater extent than general media sentiment?” we need to establish only two working hypotheses:

- **Test 1:** Cumulated online financial news sentiment does not Granger-cause the price change in the EUR/USD exchange rate
- **Test 2:** The price change in the EUR/USD exchange rate does not Granger-cause the change in cumulated online financial news sentiment

XX. Answering the research question 4: “Are there differences observable within financial media titles in terms of their influence on market price action (EUR/USD exchange rate)?” also needs the establishment of four null hypotheses. The establishment of null hypotheses for the Reuters news sentiment:

- **Test 1:** The Reuters news sentiment does not Granger-cause the price change in the EUR/USD exchange rate
- **Test 2:** The price change in EUR/USD sentiment does not Granger-cause the Reuters news sentiment change

XXI. Establishment of null hypotheses for the Bloomberg news sentiment:

- **Test 1:** The Bloomberg news sentiment does not Granger-cause the price change in the EUR/USD exchange rate
- **Test 2:** The price change in EUR/USD exchange rate sentiment does not Granger-cause the Reuters news sentiment change

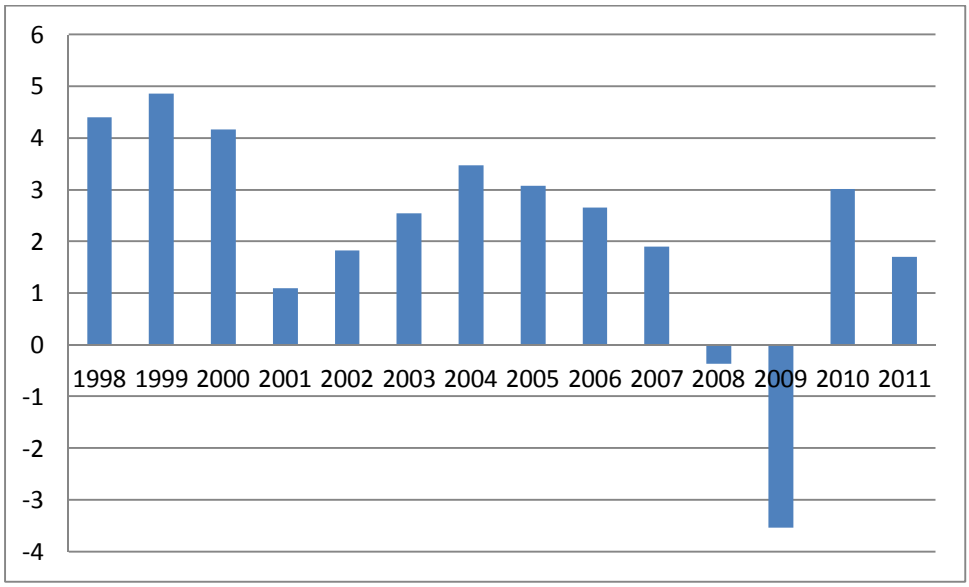
XXII. In order to answer the fifth and last research question: "Does paid financial media content influence market price action (EUR/USD exchange rate) to a greater extent than public financial media content and public global media content?" we need to again establish only two null hypotheses:

- **Test 1:** The paid financial media content does not Granger-cause the price change in the EUR/USD exchange rate
- **Test 2:** The price change in the EUR/USD exchange rate sentiment does not Granger-cause the Reuters news sentiment change

Subsequent chapters are dedicated to the description of results of the hypotheses tests introduced above.

4 Results – Wealth and Media

In the first research question, I ask whether global media sentiment does influence market price action (in our case, changes in the Dow Jones industrial Average). In order to answer this question, I used a database created for first generation media systems. The database, as already described, contains the daily averages of worldwide media sentiment. The articles are found in LexisNexis Media database and the condition for them to be analyzed using a computer supported analysis method was their relevance to economic developments in United States of America. No limitations on the news sources were introduced. I did this on purpose because I wanted to find as many articles as possible. With this, I wanted to guarantee that global media sentiment was correctly displayed. The database includes all articles found in the LexisNexis database from 1998 to 2010. All great economic upturns and downturns are, hence, represented. All in all, the database includes more than 45, 000 different articles spread over the ten-year period. Then sentiment is compared to price.

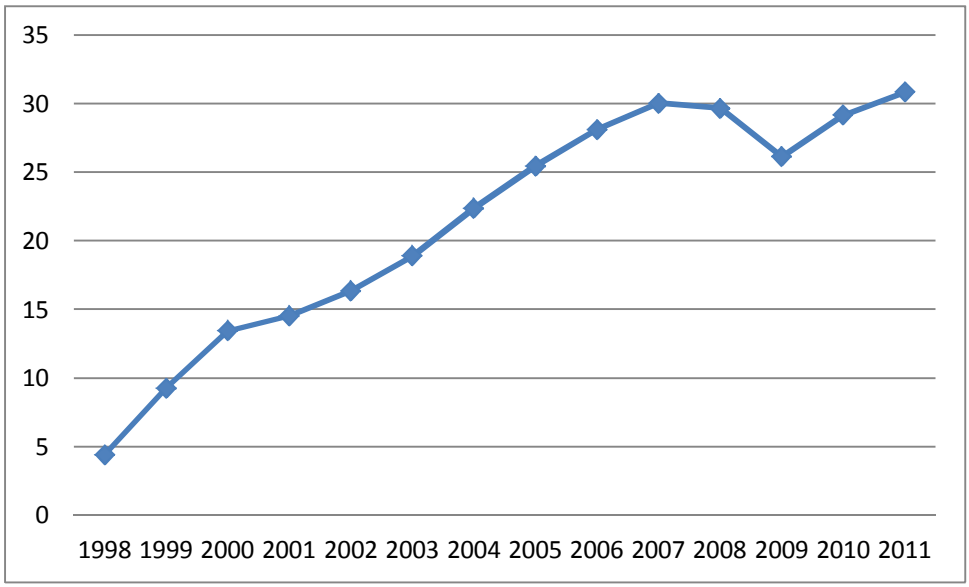


Graph 22: US GPD Growth in the Last Decade[21]

Generally it is assumed that the reviewed period was a better decade for emerging economies than it was for the large economies, like the United States. While emerging economies saw a rise in their standard of living, the U.S. saw only moderate gains, with the middle class seemingly in peril. "To the extent that there was growth this decade, it was growth that was very much credit driven, unsustainable," said Minton Beddoes, "based on

[21] Obtained from World Bank Database: http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG

rising house prices, people cashing out and living beyond their means on the basis of that" (2009). The public's perception of the economy, the fact that many now think about bank failures and bailouts, along with accounting measures and Wall Street, and the lessons learned from the financial crisis, also mark the last decade.



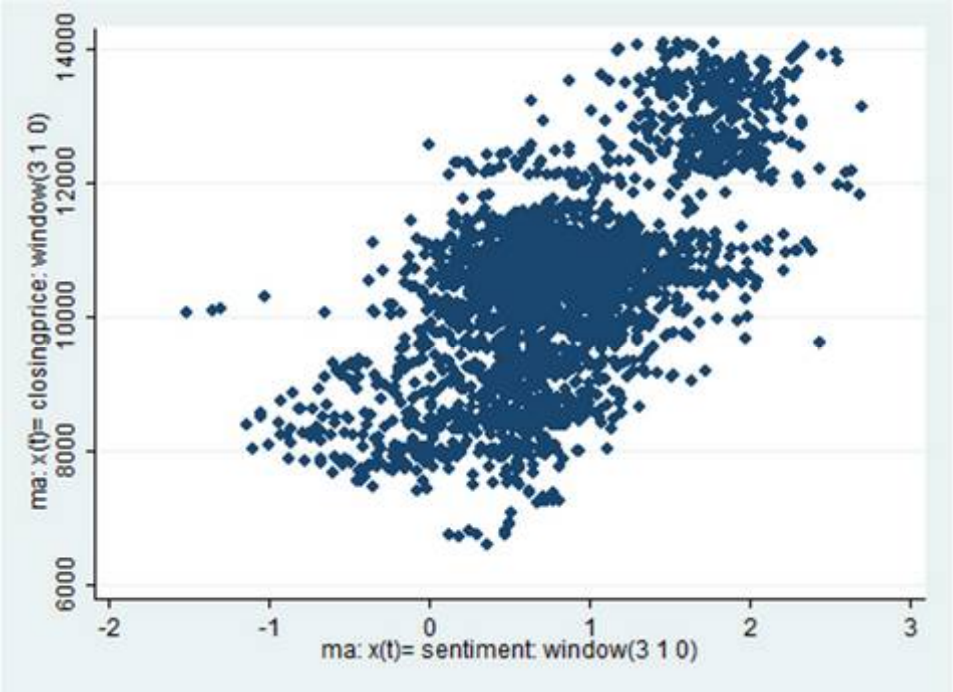
Graph 23: Cumulative Growth of US GDP in the Last Decade

However, the growth of the economy in the last decade was considerable with nominal wealth rising above the 30 percent mark in the last ten to twelve years.

"The big lesson is that we need a growth model that is less debt-fueled, that is less bubble-based, and more based on real investment, real productivity gains, real re-orientation of the economy—more towards exports," said Minton Beddoes. "A kind of more sober growth ... less binge-based ... but there's also another side to that, which is we need new customers and new people to buy American products and that has to come from greater demand growth in the big emerging economies." The U.S. in the past decade was the engine of global growth, with U.S. consumer spending propping up the global economy. Minton Beddoes says in the new decade, we'll need new sources of spending growth from elsewhere.

It must be noted that credit driven or not, the growth was significant. All in all, making debt should not be considered a negative sign for an economy. Bad debt, debt spent only for consumption, poses a problem for the economy of any size, but not debt in general. As the above chart shows, the growth of the economy in the U.S.A. was positive in twelve years out

of the displayed fourteen. 2008 and 2009 were years of great economic meltdown. The U.S. economy was hit hard in 2009.



Graph 24: Three Months Moving Average of Global Media Sentiment and the Price

The graph displayed above shows the global media sentiment of the last decade. Major trends of media sentiment can be recognized fairly easily when we look at the graph. The first central characteristic of the graph is that sentiment is concentrated in the middle point slightly above the neutral line. That is, in the majority of cases, the average media sentiment tends to be positive or as it is said, has a positive bias. In very rare cases, the media sentiment moves above the 1.5 level or below the 1.5 level. Obviously when it moves beyond that level it is indicative of some good or bad developments. This is the signal of the next important tendency: when sentiment is low, prices tend to fall, and when sentiment is high, prices tends to rise. A closer look at the graph gives a good indication that price and sentiment move together. However, at this point, we cannot speak about direct influences, and in order to measure whether media sentiment affects the market or market sentiment affects media sentiment, we have to conduct the first Granger causality test which was already introduced in the above chapter.

In order to answer the question of whether the media was influencing the market or was generally influenced by the market, we have to look at the output in attachment 1 at the end

of this thesis. The Granger causality test indicates that F for media sentiment is = 0.27 and F for price action is = 37.18. This is a clear indication that media sentiment has no significant causal influence on market price action, whereas media sentiment seems to be very strongly influenced by market price action. The results clearly indicate that market price has determined the mood of the media on U.S. economic output in the last decade. However, the influence of price lags and sentiment lags on price action or media lags is not evenly distributed. The first chart in attachment 1 indicates that price action is not affected by any media sentiment lag in the output, whereas the first price lag in the second chart is significantly and positively influencing the media mood. At the same, the second and third price lags have no significant influence on the media mood.

With this our first two hypothesis can be tested:

- **Test 1**: Global media sentiment does not Granger-cause the price change of the Dow Jones Industrial average between 1998 and 2009

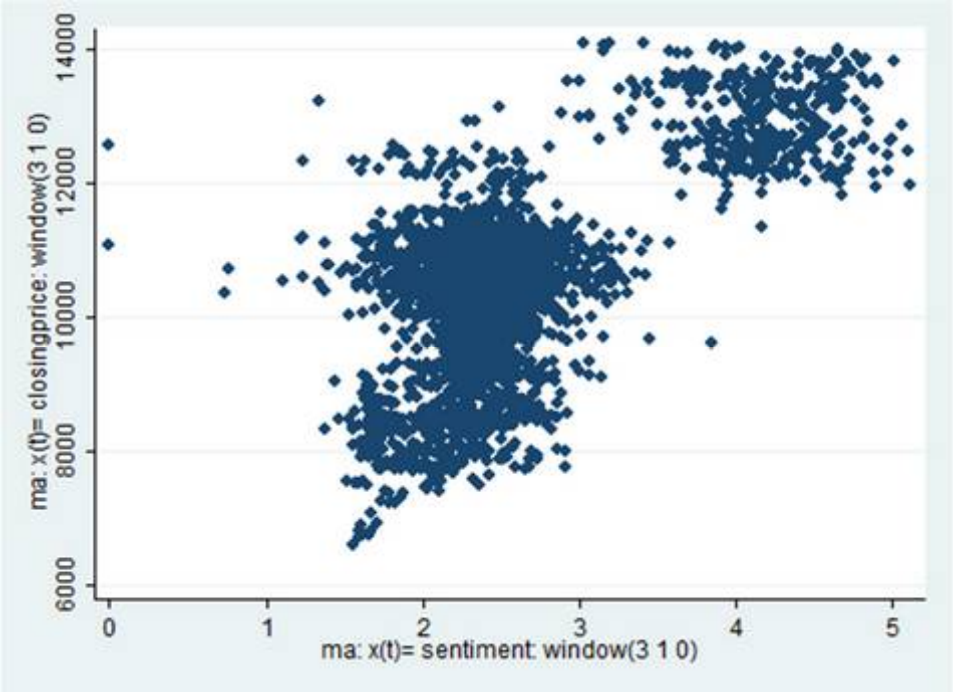
- **Test 2**: The Dow Jones Industrial Average price change does not Granger-cause global media sentiment form 1998 to 2009

In this case, test 1 is confirmed and we can observe that Global Media Sentiment, although moving with the price, does not Granger-cause the price change at least as far as the Dow Jones Industrial Average is concerned. At the same time, in test two, we reject the hypothesis and observe that the price change significantly affects media sentiment. To put it simply, global general media are strongly affected by market price action. Journalists and analysts first observe what happens with the U.S. economy and only then report about the developments.

4.1 The Impact of Positive and Negative Media Sentiment 1998 – 2008

In attachment 2, we can find the outcomes for the first part of research question 2, which asks: Does positive global media sentiment influence market price action (DJIA) in a stronger manner than negative media sentiment? The output clearly indicates that the impact of positive media sentiment over price action is not observable. At first glance, this outcome

looks very similar to the general media sentiment mood results which were described above. However, when taking a closer look we can see minor but important differences. First, we can see that the F of price action is lower than it was in the test above. Now, F stands on 24.58 instead of 34, which is an impressive reduction, but it does not make an important difference in statistical terms. Hence, it can be concluded that market price action still significantly affects positive media mood whereas positive media mood does not seem to have any major impact on market price action. However, it must be noted that taken individually, none of the price lags have a significant impact on positive media mood.

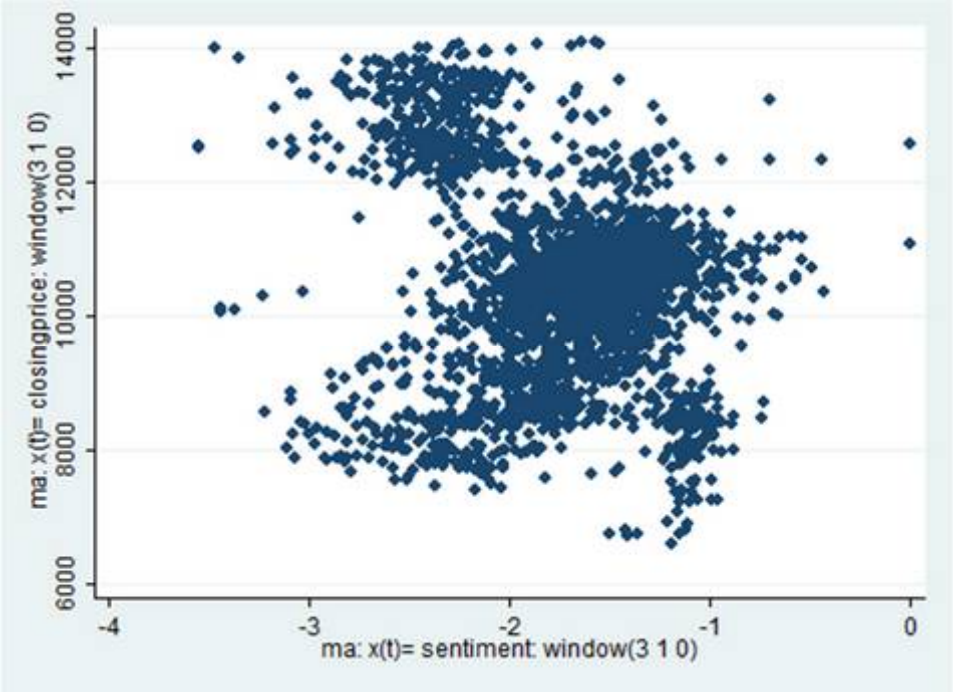


Graph 25: Three Months Moving Average of Positive Global Media Sentiment and Price

In short, here too, we can conclude that the null hypothesis that positive media sentiment does not Granger-cause price action is confirmed, whereas the second null hypothesis, that price action does not Granger-cause market price action is rejected.

But in order to answer the entire research question completely, we have to move to attachment 3, which displays the impact negative news media has over price action. This output provides a complete answer not only for the second research question but also for the third, which asks: does negative global media sentiment influence market price action (DJIA) stronger than positive media sentiment?

The output clearly indicates that the influence negative media sentiment has over price action is also not strong and statistically not significant. The F value of media sentiment remains very low. But it is important to note that the F value of the price variable continues to further degrade, remaining slightly above 5. This indicates that negative media sentiment clearly has a stronger impact on price action compared to positive sentiment values. However, this impact is statistically not significant. Here too, individual price lags have no significant statistical impact on media sentiment.



Graph 26: Three Months Moving Average of Negative Global Media Sentiment and Price

With this, we can conclude that neither positive nor negative media sentiment has any impact on price action. Here too, the mood of media is strongly affected by market price action.

With this, we need to return to the established hypotheses and examine whether they were rejected or confirmed. In this case we have to deal with Hypothesis II and III. They state accordingly:

The second set of hypotheses is designed to answer the research question 11: Does positive global media sentiment influence market price action (DJIA) in a stronger manner than negative media sentiment?

- **Test 1:** Positive global media sentiment does not Granger-cause price change of the Dow Jones Industrial Average between 1998 and 2009.
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause positive global media sentiment

A performed Granger causality test indicates that the first test is confirmed and that positive global media sentiment does not Granger-cause the Dow Jones Industrial Average price action. The second test, however, is rejected: this means that positive media sentiment is directly affected by market price action. That is, journalists and analysts are positively biased when the price and, hence the economic state of the U.S.A., improves.

The third set of null hypotheses aims to answer research question 1.2: Does negative global media sentiment influence market price action (DJIA) in a stronger manner than positive media sentiment?

- **Test 1:** Negative global media sentiment does not Granger-cause the price change of the Dow Jones Industrial Average between 1998 and 2009
- **Test 2:** The Dow Jones Industrial Average price change does not Granger-cause negative global media sentiment between 1998 and 2009

Results in this set of tests is somehow different from that of previous tests, where global news sentiment seemed to have no significant influence on price action but where price change significantly affected media sentiment and mood. In this third set of tests, we see that the first test is confirmed. That is, like positive media tonality, negative media tonality seems to have no impact on price action. At the same time, the second null hypothesis is rejected. Negative media mood is affected by price action. Below, I provide a table which summarizes the test results. In this table, we can clearly see that first generation news delivery systems seem to be strongly affected by the Dow Jones Industrial Average price action.

Please note that in all tables which provide test summaries, the results marked in red show statistically significant influences.

The bellow table clearly shows that price Granger-causes global news media sentiment.

	Test 1: Sentiment Granger-Causes Price	Test 2: Price Granger-Causes Sentiment
Global Media Sentiment	F (3, 1012) =0.27 Probability > F = 0.8465	F (3, 1012) =37.18 Prob > F = 0.0000
Positive Global Media Sentiment	F(3, 1012) = 0.23 Prob > F = 0.8721	F(3, 1012) = 24.58 Prob > F = 0.0000
Negative Global Media Sentiment	F(3, 1012) = 0.26 Prob > F = 0.8535	F(3, 1012) = 5.95 Prob > F = 0.0005

Table 1: Global news Sentiment - Test Summary

The cumulative global news media sentiment displays the greatest influence followed by the positive global news sentiment. That is, media seem to be positively biased when price is moving in the upward direction. We observe the weakest influence in negative global media sentiment. However, in statistical terms, here too the results are highly significant.

4.2 Business Cycles and Media Sentiment Effects

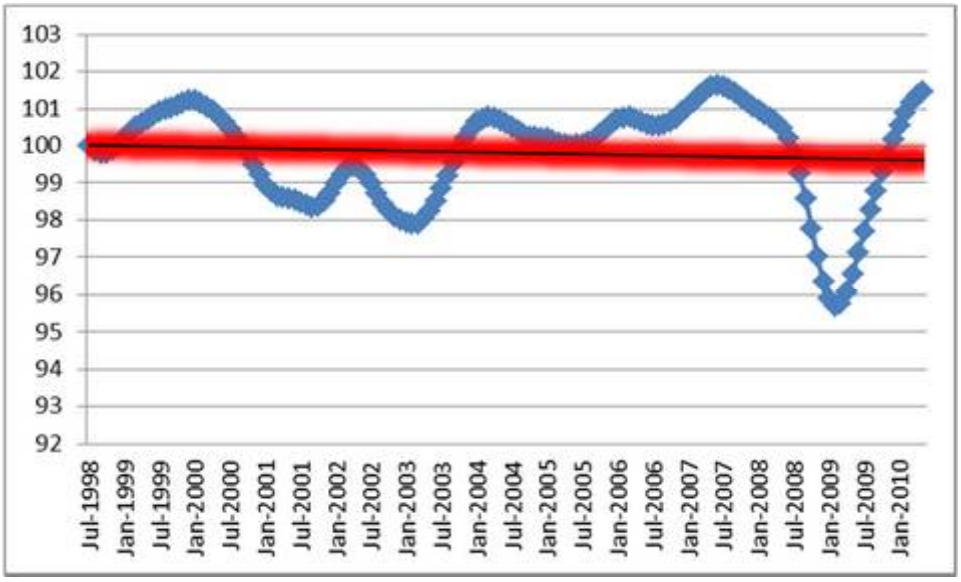
At this stage, we have to turn our attention to the fourth research question which asks whether we can observe different global media sentiment effects on market price action (DJIA) in different business cycles.

In doing this, I have two aims: first, I would like to test whether news has different effects in different economic environments and second, to see whether the impact of the news increases over the time. As shown in Chapter 2, various economic studies provide hints that news might have different effects on market price action depending on economic cycles. Two factors play a significant role here: first, economic upturn and downturn phases should be taken into account, and second, media tonality has to be observed. In this subchapter we will examine the effect of the news generally in different business cycles; in a consequent subchapter we will see whether different media tonality might have some significant effect in various business climates. Furthermore, by splitting the tests into business cycles, we will see whether the increasing news effects are observable in time. The argument here is as follows: it might be that when seeing global media sentiment as one large database where

sentiments from all the years are drawn together, the effects of the news are not as observable as the news from the years, say, 1998 and 1999 as much as the news from the years 2009 and 2010. Taken separately, it might be argued, we can observe no news effects in earlier years but strong effects in later years as mediatization effects increase. Splitting the database in five different business cycles will allow us to see whether the effects of the news really increase over time.

As already noted in the methodology chapter, business cycles are detected using OECD leading indicator. When the indicator fluctuates above the 100 point, it might be assumed that the economy is in uptrend, and when it is below the 100 point, it might be argued that the economy is in downtrend.

At this point, I one again provide the OECD leading indicators chart but this time with a trend line, so that we can identify the different business cycles. If we compare the OECD leading indicator chart to the GDP growth chart, we can see very interesting differences and similarities. As we saw above, the cumulative GDP growth was more than 30 percent in the last decade. However, the OECD leading indicators trend line clearly indicates that the economic trend tends to decline.

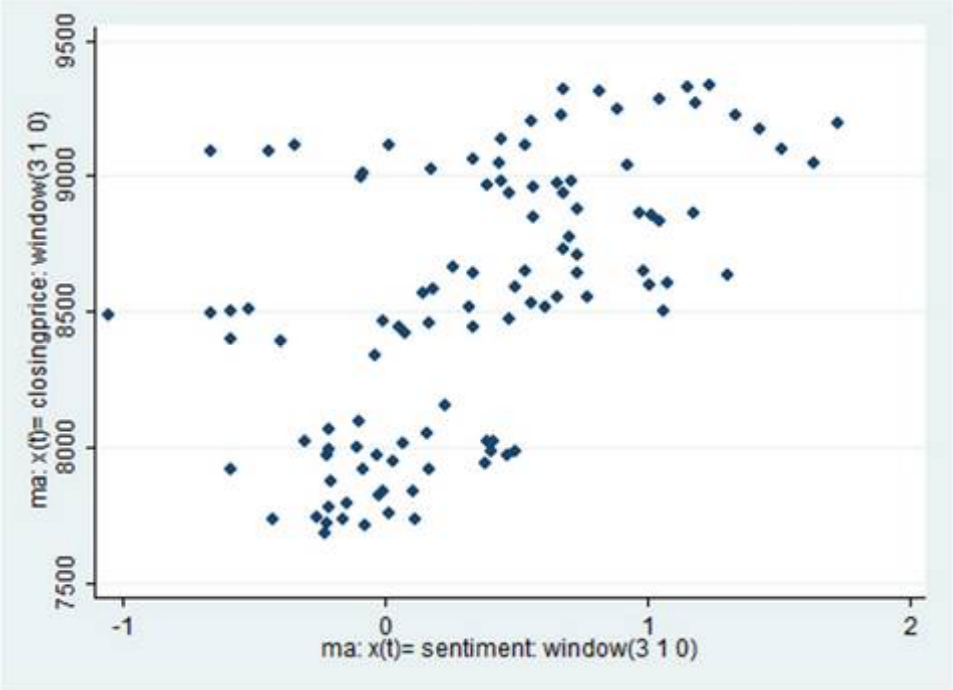


Graph 27: OECD Leading Indicators with 100 Point Trend Line

A second important difference between the two charts is also that in the last decade, we had only two years (2008 and 2009) where the GDP growth slipped into the negative. OECD

leading indicators show, however, that the economy has been in the negative area three times. The first time was the famous 1998 crisis that originated in the Asian markets. The second time, the U.S. economy experienced significant downward pressure from 2000 to 2003 (this is not observable in the GDP chart). The third time, the economy was hard hit in the 2008—2010 periods. Here the GPD chart and OECD leading indicators chart provide similar results. It must be noted that the growth of the GDP does not necessarily indicate a healthy economic situation as it was not invented for the measurement of upturns and downturns. I would rather suggest interpreting both chart results as follows: the U.S. GDP remained in the positive area despite strong negative pressure in the years of 1998 and 2000 to 2003. This was, however, not possible in the 2008—2010 time period where GDP has slipped into the negative area. To put it succinctly: OECD Leading Indicators measure pressure on the economy whereas GDP growth displays how good is the response of the country's economy to that pressure.

Attachment 4, which provides output for a short downtrend business cycle in 1998, indicates that media sentiment does not significantly affect market price action. However, the impact of market price action on media sentiment is very low and statistically not significant. Also, individual lag values for both variables remain insignificant. In this case, the null hypothesis in both variations will be confirmed. That is: media sentiment doesn't Granger-cause price change but at the same time, price change does not Granger-cause media sentiment. During a short period of economic downturn, the causal relationship of the two variables cannot be established.



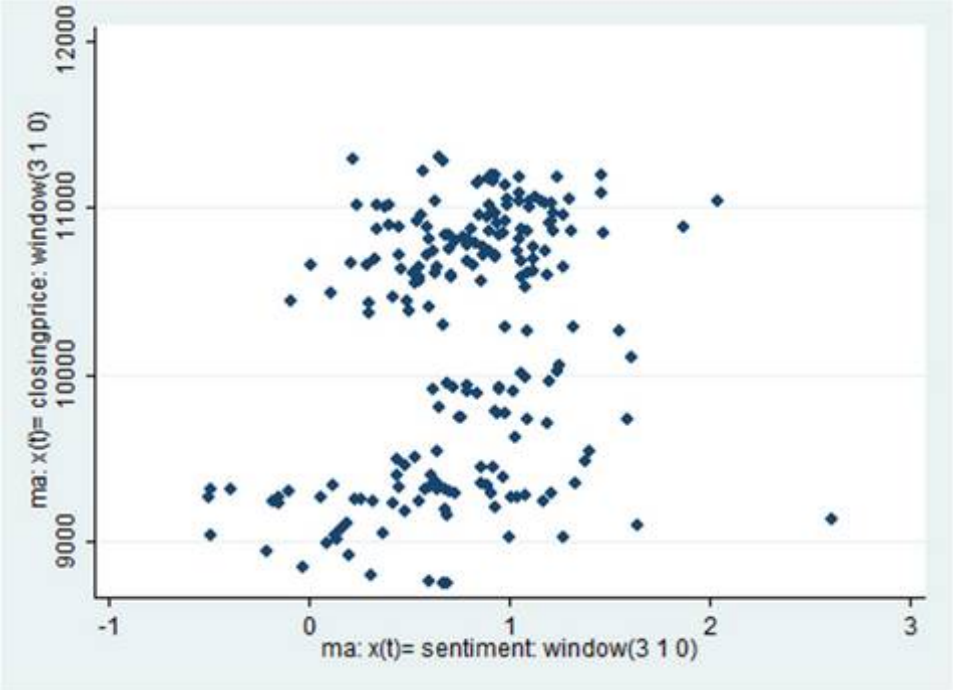
Graph 28: Business Cycle 1 - Global Media Sentiment and Market Price

The above graph provides a clear picture. In this downtrend cycle, both global media sentiment and price seem to show the tendencies already observed in the other charts: global media sentiment tends to stay above zero, but at the same, in situations of extreme price fall, it is also demonstrates a negative trend. However, in terms of statistics, two variables seem to be driven not by each other but by other factors. The fourth set of hypotheses are confirmed.

- **Test 1:** Global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend of 1998
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause global media sentiment in the downtrend of 1998

The confirmation of test 1 indicates that global media sentiment has no influence on market price action. The confirmation of test 2 provides clear evidence that media sentiment is not affected by price change itself.

The fifth attachment, which observes the relatively long period of economic uptrend from 1998 to 2000, provides a very similar picture. The F values for both variables remain very low and insignificant. Also, individual lags do not significantly affect price.



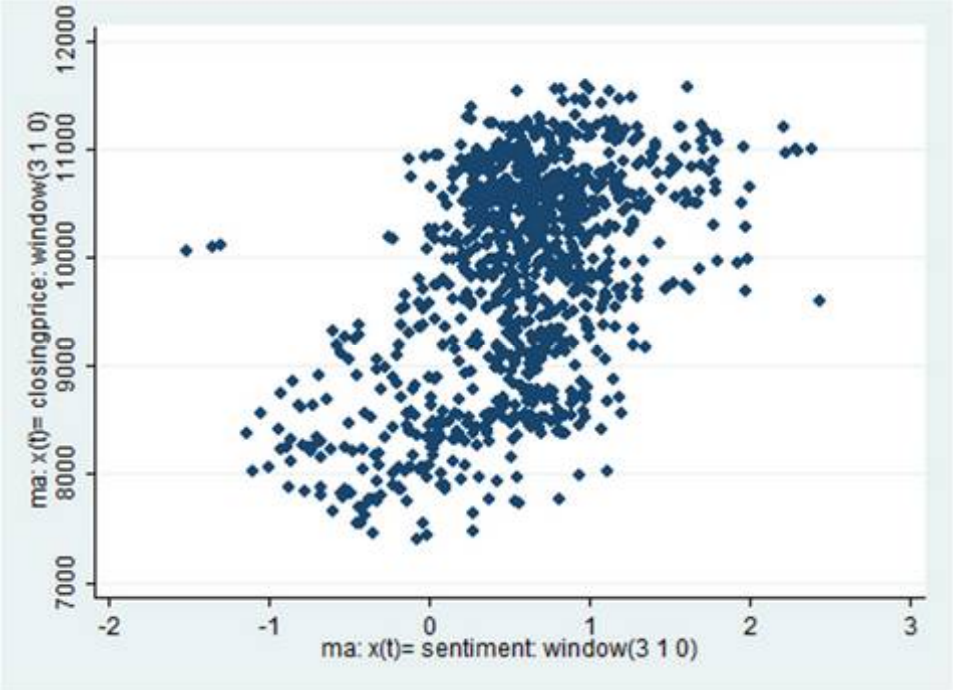
Graph 29: Business Cycle 2 - Global Media Sentiment and Market Price

Here, we tested the fifth set of Granger-causality hypotheses.

- **Test 1:** Global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the uptrend from 1998 to 2000
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause global media sentiment in the uptrend from 1998 to 2000

The results of the test are similar those of four: hypothesis test 1 is confirmed, indicating that the media has no significant influence on market price action, also on the uptrend. At the same time we observe in test 2 that neither does market price action influence what the journalists and analysts think is happening or will happen with the U.S. Economy.

The sixth attachment provides the results for the third business cycle. The period of 2000 – 2003, an economic downturn, provides a different picture. Now, we can observe that media sentiment is strongly affected by price change (F is above 15) whereas the effects of news media on price change remain very low. Strangely enough, however, the third price lag is statistically significant on the 0.05 percentage level. In the chart provided below, we can observe similar central tendencies already seen in other observations.



Graph 30: Business Cycle 3 - Global Media Sentiment and Market Price¨

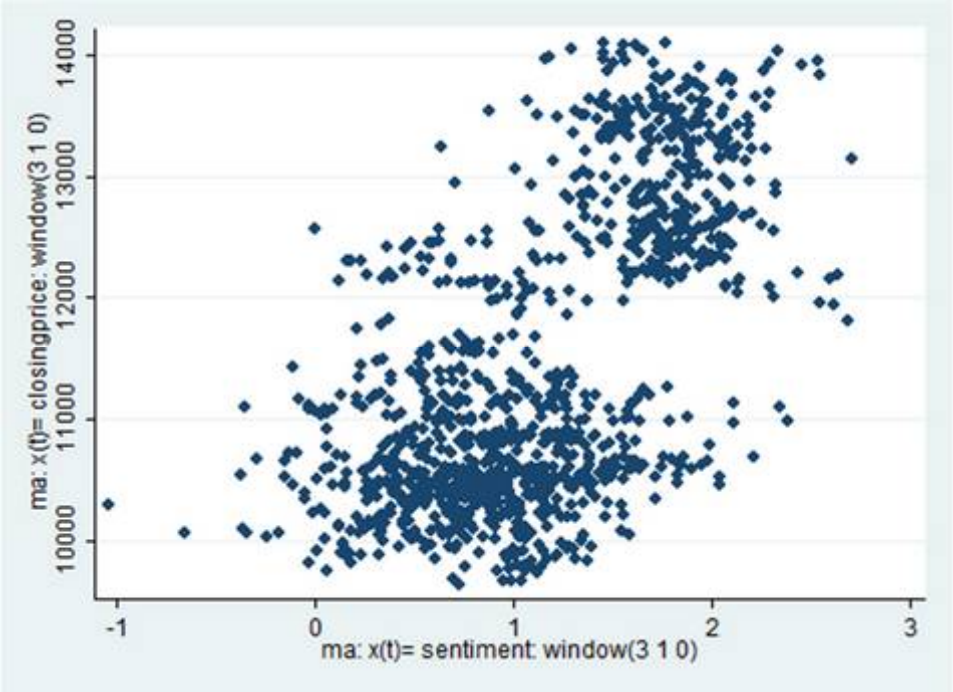
With the third test, we can claim that the influence of the news on price action remains low, whereas the influence of price action on global media sentiment increases. Let us take a quick look at the hypothesis:

- **Test 1:** Global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend from 2000 to 2003
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause global media sentiment in the downtrend from 2000 to 2003

Here, the hypothesis in test 1 is confirmed, and we observe that global media sentiment has no significant effect on market price action. At the same time, the hypothesis in test 2 is rejected as we see the strong influence of market price action on global news sentiment. This is a true turn-around in our measurements. Over time, price action seems to affect the news significantly and not vice versa, as we have expected.

The seventh attachment continues the story told by the previous output. Here we observe the economic uptrend of the years 2003 – 2008. The results indicate strong price action impact on media sentiment and no impact of the media on price change. The eighth attachment completes the picture. Here we look at the last years in our database, that is,

from 2008 to 2009. This period was very turbulent and caused slowed down global economic activity. But the general picture, which we were observing during the entire review, remained unchanged: media mood was significantly affected by market price action, and market price change remained unaffected by the media mood.



Graph 31: Business Cycle 4 - Global Media Sentiment and Market Price

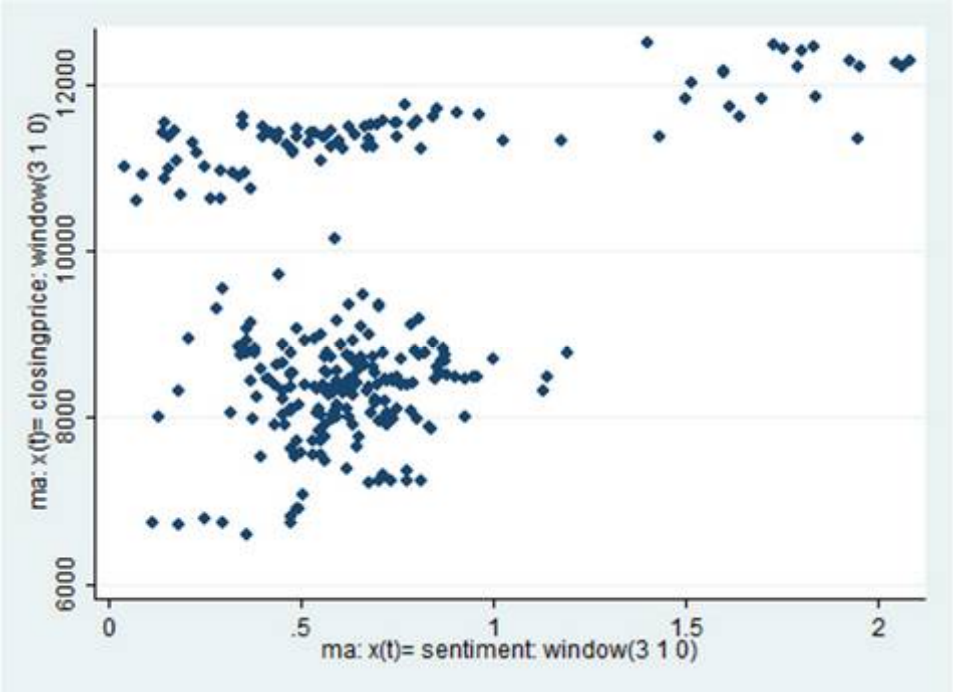
In set seven of Granger-causality hypotheses we check:

- **Test 1:** Global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the uptrend from 2003 to 2008
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause global media sentiment in the uptrend from 2003 to 2008

Here the hypothesis in the first test is confirmed. We observe that global media sentiment has no significant influence on market price action. But at the same, test two is rejected and we observe that market price continues to exert increasing influence on global media opinion formation.

As a last step in this subchapter, we examine a working hypothesis developed for the fifth business cycle, which was a very strong downtrend. Here we continue to observe results similar to the third and fourth business cycle hypotheses tests. It is interesting to observe

that during the time of this deep crisis, media sentiment remained in the positive area throughout entire sample collection period.



Graph 32: Business Cycle 5 - Global Media Sentiment and Market Price

- **Test 1:** Global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend from 2008 to 2009
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause global media sentiment in the uptrend from 2008 to 2009

The hypothesis in test 1 is confirmed, showing that global media sentiment has no significant influence on market price action. Test 2 rejects the second hypothesis, indicating that price Granger-causes global media sentiment. However, it must be noted that the value of F is in this case not as high as in the third and fourth business cycle examinations. Still, its value remains significantly high.

All in all, I cannot observe any differing impact of the news on price action in different business cycles. Maybe the picture will change when we look at positive and negative media sentiment in the subchapters below.

	Test 1: Sentiment Granger-Causes Price	Test 2: Price Granger-Causes Sentiment
Business Cycle 1: Downtrend: 1998	**F(3, 32) = 0.65 Prob > F = 0.5902**	**F(3, 32) = 2.16 Prob > F = 0.1118**
Business Cycle 2: Uptrend: 1998 - 2000	**F(3, 71) = 0.49 Prob > F = 0.6898**	**F(3, 71) = 2.39 Prob > F = 0.0758**
Business Cycle 3: Downtrend: 2000 - 2003	**F(3, 370) = 0.17 Prob > F = 0.9183**	**F(3, 370) = 15.33 Prob > F = 0.0000**
Business Cycle 4: Uptrend: 2003 – 2008	**F(3, 415) = 0.53 Prob > F = 0.6613**	**F(3, 415) = 17.11 Prob > F = 0.0000**
Business Cycle 5: Downtrend: 2008 - 2009	**F(3, 94) = 0.79 Prob > F = 0.5008**	**F(3, 94) = 4.72 Prob > F = 0.0041**

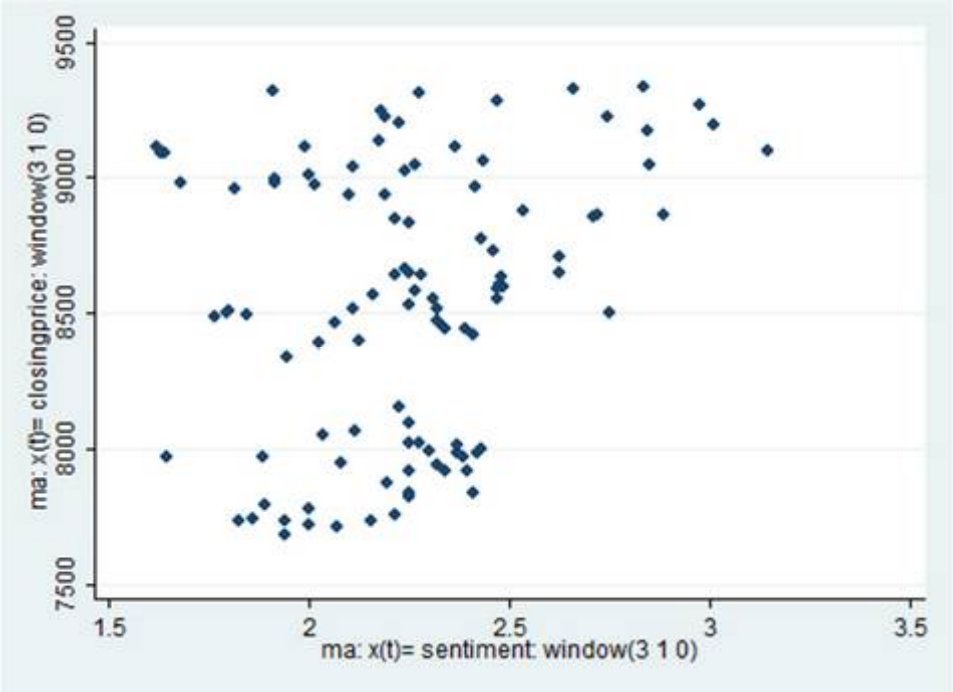
Table 2: Global Media Sentiment in Business Cycles

The table above clearly displays the trend which is going on, contrary to our expectations. We see market influence on first generation news delivery systems increasing over the years. In first two business cycles, there is no causal influence observable. However, the picture changes in the third business cycle when second tests, which are designed to measure the influence of price action on global news sentiment, become statistically significant and remain so during the entire examination period.

4.3 Business Cycles, Positive and Negative Media Sentiments

I also would like to examine whether we can observe different positive global media sentiment effects on market price action (DJIA) in different business cycles. In the sixth research question I ask whether similar observations can be made for negative media sentiment. For answering this question, tests similar to the ones presented above are necessary. Now, however, we only look at positive media sentiment and its effects on market price action. In the graph under attachment 9, we look at positive media sentiment during the economic downturn of 1998. There we observe that neither media sentiment nor

price action have significant causal impact on each other. Also, individual lag values remain statistically insignificant.



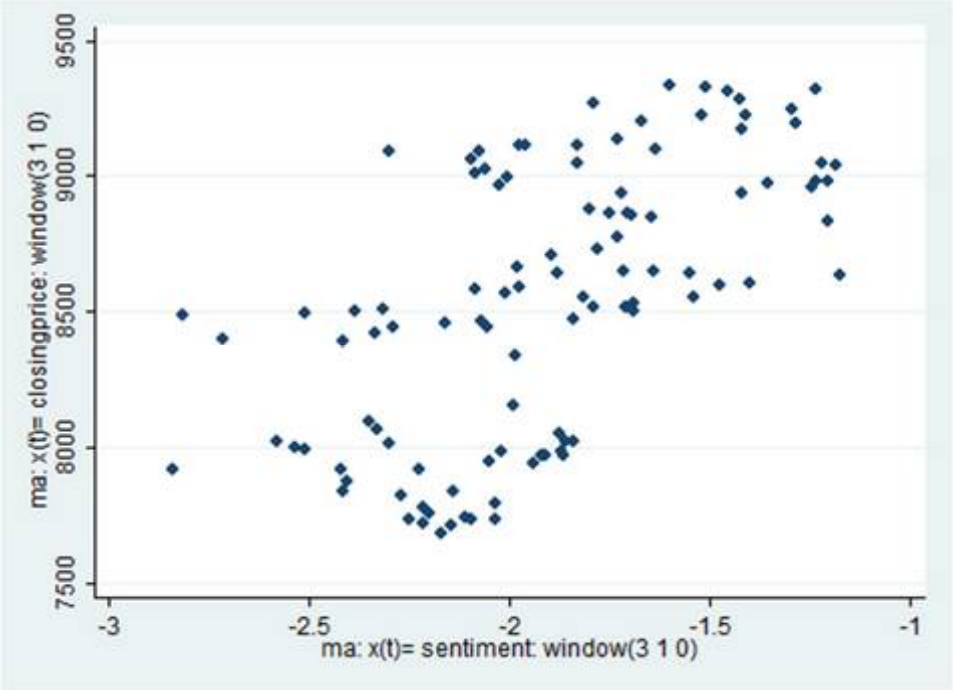
Graph 33: Business Cycle 1 - Positive Global Media Sentiment and Market Price

The graph above clearly indicates that there is no central tendency observable. The hypotheses tests were as follow:

- **Test 1:** Positive global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend of 1998
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause positive global media sentiment in the downtrend of 1998

Both tests are confirmed, showing that neither market price nor positive global media sentiment have any influence on each other in this first business cycle.

The same results are displayed in attachment 10, which shows the output for negative media news in 1998.



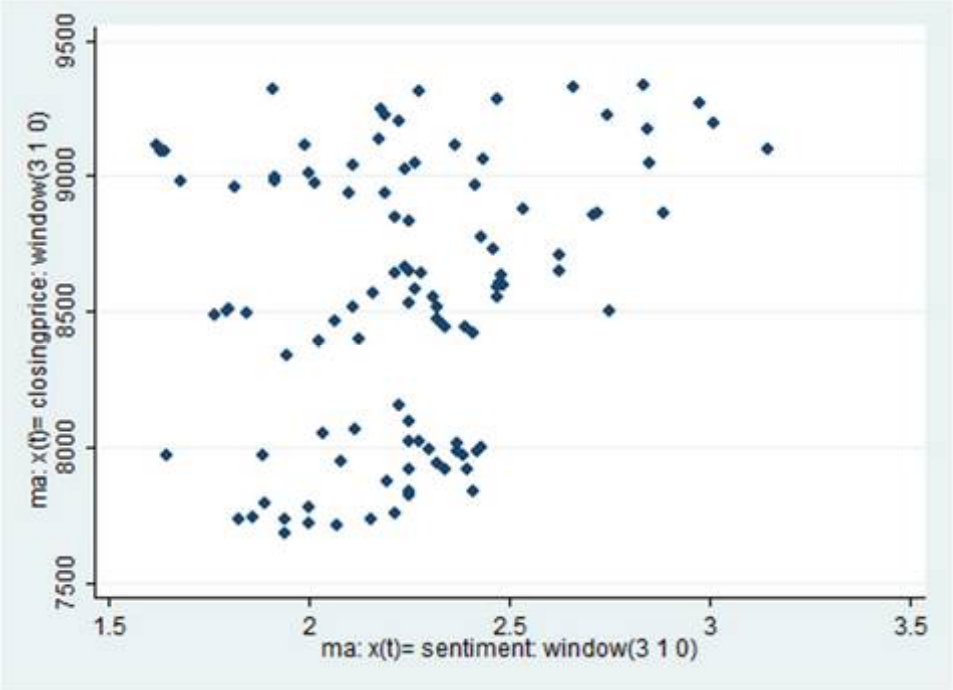
Graph 34: Business Cycle 1 - Negative Global Media Sentiment and Market Price

Also on the graph above, no central tendency is observable. The hypotheses tests here are as follows:

- **Test 1:** Negative global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend of 1998
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause negative global media sentiment in the downtrend of 1998

The hypotheses in both tests are confirmed. Therefore, I am not able to observe any significant influence of negative global news sentiment on the market price; at the same time, I am not able to observe the effects of price change on the negative mood of the global media.

Nearly similar results are displayed for the period of 1998 – 2000 in attachment 11. Here too, no causal relationship can be observed between market price action and positive media sentiment.

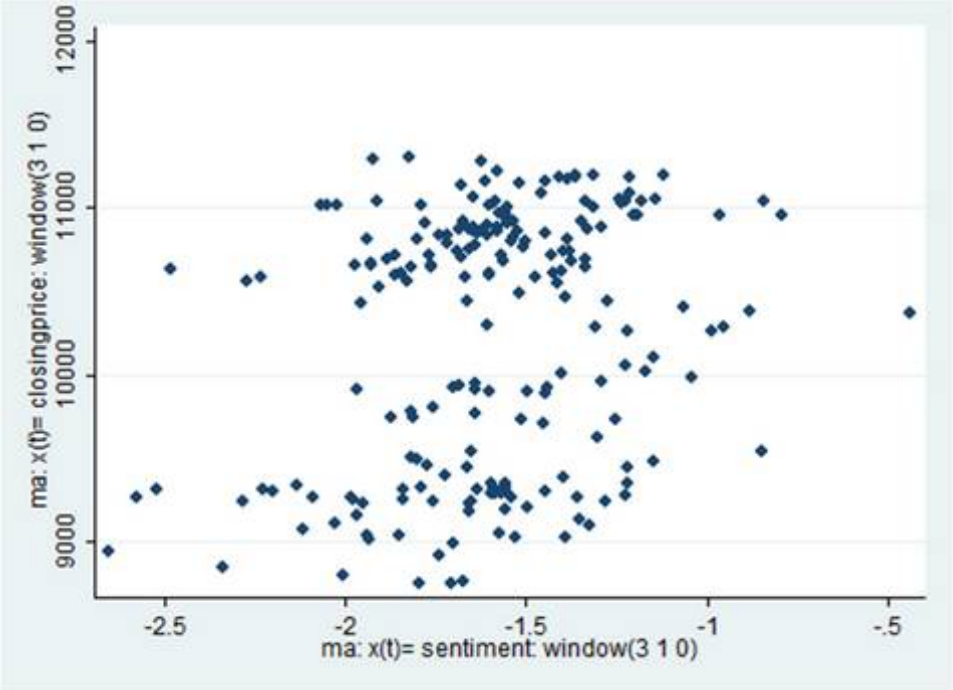


Graph 35: Business Cycle 2 - Positive Global Media Sentiment and Market Price

- **Test 1:** Positive global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend from 2000 to 2003
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause positive global media sentiment in the downtrend from 2000 to 2003

Both hypotheses are confirmed, showing that the variables have no effect on each other.

Also, negative media sentiment and market price action do not display any causal relationship for the same period in the results which are displayed in attachment 12.



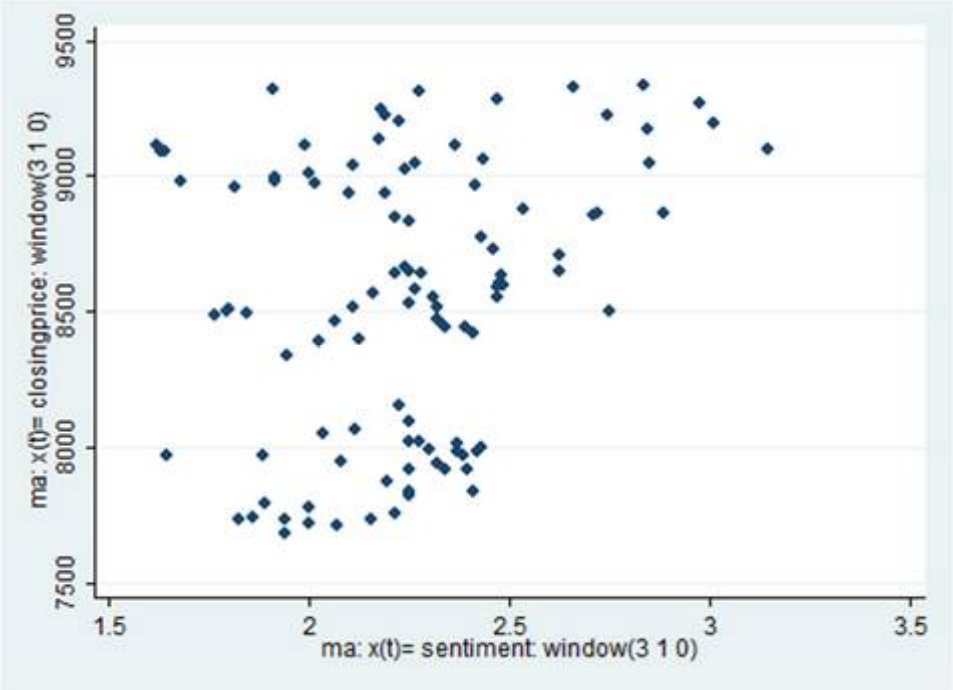
Graph 36: Business Cycle 2 - Negative Global Media Sentiment and Market Price

- **Test 1:** Negative global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the uptrend from 1998 to 2000
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause negative global media sentiment in the uptrend from 1998 to 2000

Both tests are confirmed, indicating that there is no causal relationship between the two variables during the economic uptrend of 1998 – 2000.

At this point we can stop and look at the results which we already have obtained. Here, we can see one important tendency: in the beginning of the measurements, the reciprocal influence of global media sentiment and market price is actually nonexistent. The picture changes gradually when we near the later stages of the measurements, and the effects of price change on first generation news delivery systems significantly increases.

The picture is slightly changed in the same direction as described above in output in attachment 13, which observes the effects of positive media sentiment during the 2000 – 2003 business cycle. Here, the F value of the market price variable is increasing, and results become statistically significant on the 0.1 confidence level.



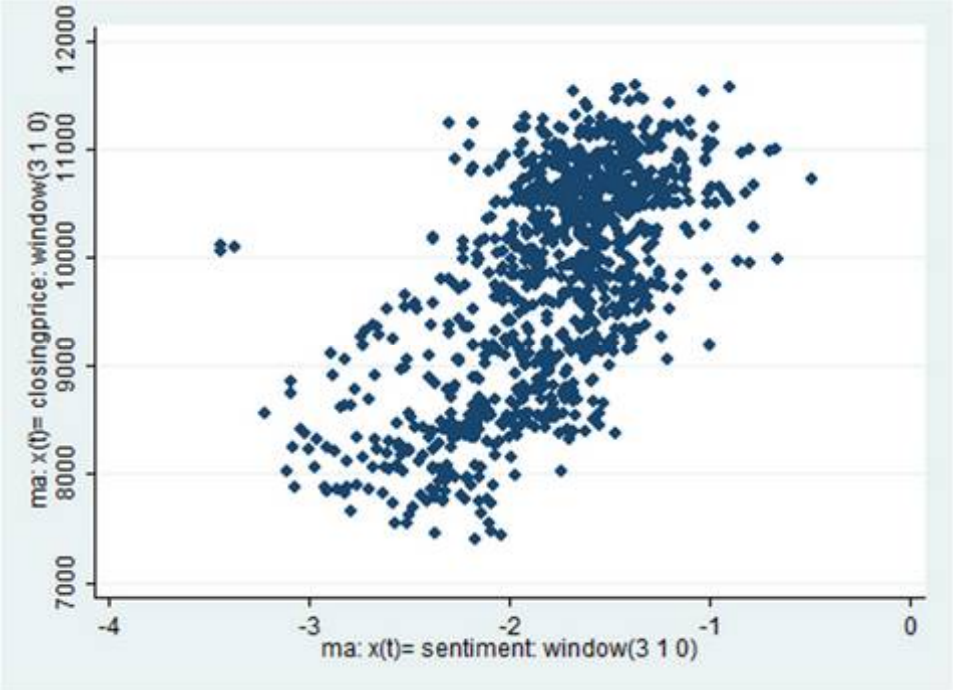
Graph 37: Business Cycle 3 - Positive Global Media Sentiment and Market Price

- **Test 1:** Global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend from 2000 to 2003
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause global media sentiment in the downtrend from 2000 to 2003

In this case, the hypothesis in the first test is confirmed, indicating that positive global media sentiment does not affect price action. Contrary to this, the hypothesis in the second test is rejected, showing a significant influence of market price action on global media sentiment.

Also, negative media sentiment is strongly affected by price action at the same time (please refer to attachment 13 for details). In individual lag variables, price lags become statistically significant.

This once again confirms that the role of the markets and prices in media reporting is increasing over time. Here, the F value in the second test increases even to a greater extent than was the case in the positive news examination.

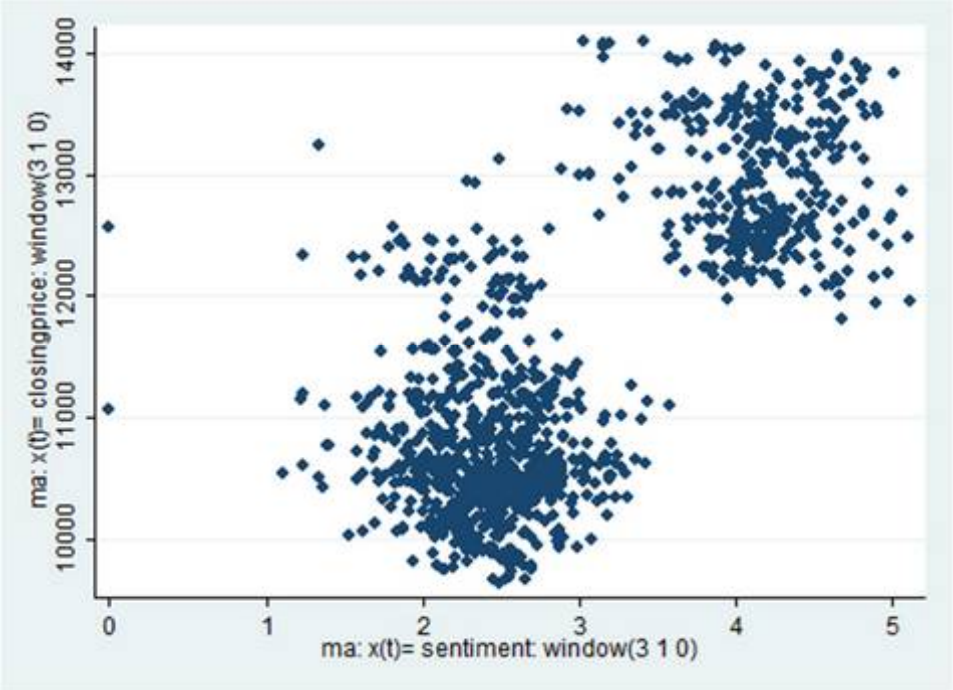


Graph 38: Graph 36: Business Cycle 3 - Negative Global Media Sentiment and Market Price

- **Test 1:** Negative global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend from 2000 to 2003
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause negative global media sentiment in the downtrend from 2000 to 2003

Here we observe that first test is confirmed. Negative global media sentiment has no effect on price action as far as the Dow Jones Industrial Average is concerned. At the same time, the hypothesis in second test is confirmed, indicating the increasing influence of market price action on the development of a negative mood in first generation news delivery systems. With markets becoming more powerful on year to year basis, it seems that their influence constantly increases.

The impact of the price variable on positive media news becomes even more obvious in the output displayed in attachment 15. Here, we can clearly observe the very high value of F for price variable and a very low F value of the media sentiment variable. Hence, it can be concluded that the impact of price over positive media sentiment has further significantly increased between the 2003 – 2009 periods.



Graph 39: Business Cycle 4 - Positive Global Media Sentiment and Market Price

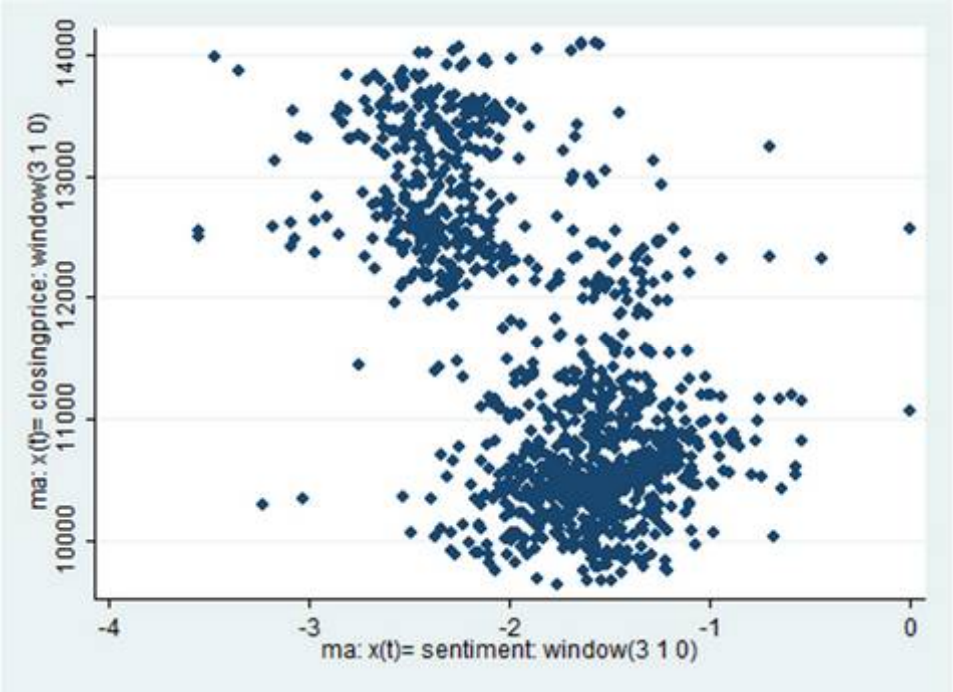
- **Test 1:** Positive global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the uptrend from 2003 to 2008
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause positive global media sentiment in the uptrend from 2003 to 2008

The hypothesis in test 1 is confirmed, indicating that positive news media sentiment does not influence price change. At the same, we observe that the hypothesis in test 2 is rejected, herewith establishing the Granger-causality.

A similar picture is shown in the sixteenth attachment for negative media sentiment. The F value of the Dow Jones Industrial Average variable is very high, pointing towards very strong influence on third generation news delivery systems. The tested hypotheses in this case are as follows:

- **Test 1:** Negative global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the uptrend from 2003 to 2008
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause negative global media sentiment in the uptrend from 2003 to 2008

The graph displayed below shows the same central tendencies as the other pictograms shown above.



Graph 40: Business Cycle 4 - Negative Global Media Sentiment and Market Price

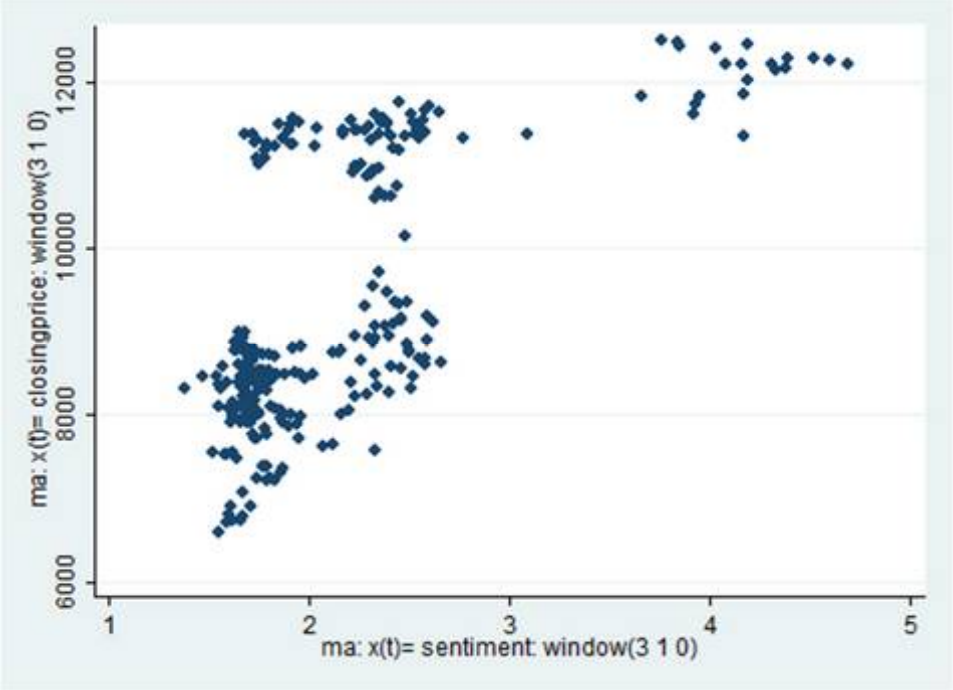
The hypothesis in first test is confirmed, showing once again that there is no significant influence from first generation news delivery systems on the Dow Jones Industrial Average. Here, once again, we also observe the very powerful effect of the market price action on journalists and analysts.

However, the picture changes again during the 2008 – 2009 business cycles. Here no causal relationship is observable between positive media sentiment and market price action. Likewise, negative media sentiment and market price change seem to have no causal relationship with each other.

First, let us look at the market/positive media news established hypothesis:

- **Test 1:** Positive global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend from 2008 to 2009
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause positive global media sentiment in the uptrend from 2008 to 2009

In test 1, the null hypothesis is confirmed. Hence, no influence of first generation media systems on the market is observable. But similarly to this, the hypothesis in second test is also confirmed, showing no influence of market price action on global news sentiment.



Graph 41: Business Cycle 5 - Positive Global Media Sentiment and Market Price

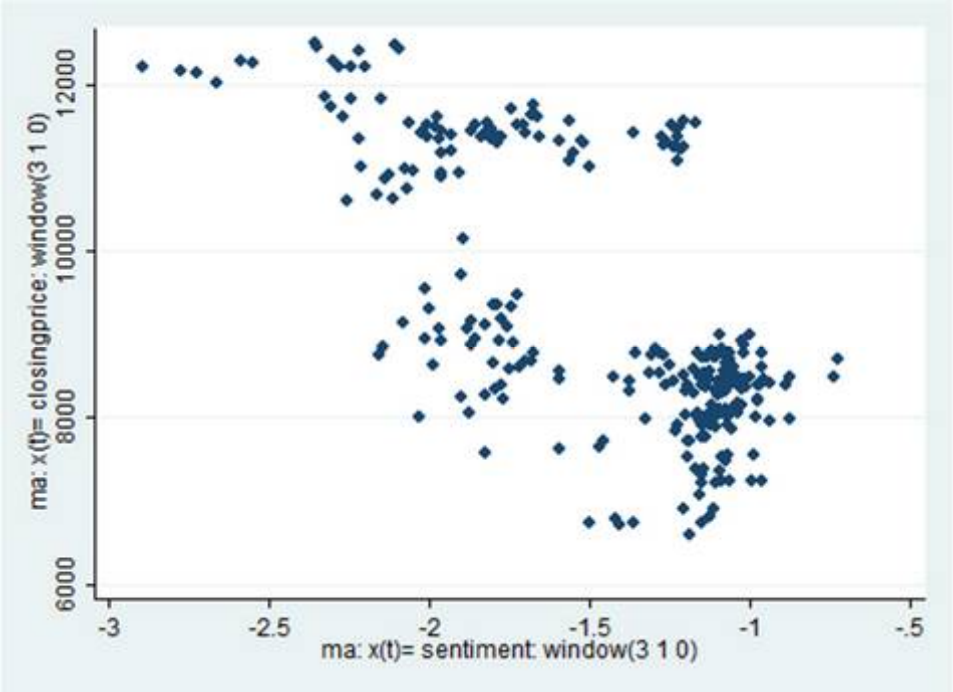
If we take a closer look at the chart above, we will see that the central tendency which we observed on many different charts previously is disappearing at this point. Only one small cluster in the above right corner reminds us that the media still tend to follow market prices; however, this cluster is unable to provide any interesting explanations in statistical terms.

As noted, a similar picture is observed when looking at negative media sentiment in the fifth business cycle. First, let us look at the established hypothesis:

- **Test 1:** Negative global media sentiment does not Granger-cause the Dow Jones Industrial Average price change in the downtrend from 2008 to 2009
- **Test 2: The** Dow Jones Industrial Average price change does not Granger-cause negative global media sentiment in the uptrend from 2008 to 2009

In these tests, both established hypothesis are confirmed. Hence, I am unable to observe any previous patterns in this final business cycle. The graph provided below shows very uncommon patterns. The negativity of global media sentiment seems to strengthen, even as

price is moving in a positive direction. I will provide my explanations for this phenomenon later in the concluding chapter.



Graph 42: Business Cycle 5 - Negative Global Media Sentiment and Market Price

In last two subchapters, we observed a very interesting tendency, and this tendency was contrary to our expectations. With increasing mediatization of the society, I personally would expect to observe some increasing effects of global news sentiment on market price action. However, surprisingly, we first saw no reciprocal effects of global news media and price action; later on, in consequent business cycles, we observed the increasing influence of market price on media sentiment, only to see it vanishing once again in the last business cycle where the graphs provided above are hard to explain. Is this proof that speaking about the mediatization process is simply speculation, impossible to observe empirically? Or are these developments possibl due to mediatization? Let me leave this question open and address it later on.

In order to summarize the results, I provide two tables with the test summary below and will go through the entire table once again. Here too, as always, significant results are marked in red.

	Test 1: Sentiment Granger-Causes Price	Test 2: Price Granger-Causes Sentiment
Business Cycle 1: Downtrend – Positive Global Media Sentiment	**F(3, 32) = 1.66 Prob > F = 0.1958**	**F(3, 32) = 0.64 Prob > F = 0.5974**
Business Cycle 2: Uptrend – Positive Global Media Sentiment	**F(3, 71) = 0.18 Prob > F = 0.9079**	**F(3, 71) = 2.01 Prob > F = 0.1202**
Business Cycle 3: Downtrend – Positive Global Media Sentiment	**F(3, 370) = 0.24 Prob > F = 0.8691**	**F(3, 370) = 4.25 Prob > F = 0.0057**
Business Cycle 4: Uptrend – Positive Global Media Sentiment	**F(3, 415) = 1.03 Prob > F = 0.3772**	**F(3, 415) = 16.32 Prob > F = 0.0000**
Business Cycle 5: Downtrend – Positive Global Media Sentiment	**F(3, 94) = 1.40 Prob > F = 0.2464**	**F(3, 94) = 1.90 Prob > F = 0.1350**

Table 3: Summary of Positive Global News Sentiment in Business Cycles

It should not come as a surprise that a positive global media sentiment table resembles that of the global media sentiment table with nearly identical results in terms of statistics. The first years of the examination and two business cycles show no causal relationship between the two variables. The situation changes in the third and fourth business cycles where market price change starts to affect media sentiment. However, there is a slight difference between the two tables: in the positive media sentiment table we observe that there is no statistically significant causal relationship.

	Test 1: Sentiment Granger-Causes Price	Test 2: Price Granger-Causes Sentiment
Business Cycle 1: Downtrend – Negative Global Media Sentiment	**F(3, 32) = 0.16 Prob > F = 0.9245**	**F(3, 32) = 1.78 Prob > F = 0.1707**
Business Cycle 2: Uptrend –	**F(3, 71) = 1.50**	**F(3, 71) = 2.18**

Negative Global Media Sentiment	**Prob > F = 0.2215**	**Prob > F = 0.0979**
Business Cycle 3: Downtrend – Negative Global Media Sentiment	**F(3, 370) = 0.46** **Prob > F = 0.7114**	**F(3, 370) = 10.53** **Prob > F = 0.0000**
Business Cycle 4: Uptrend – Negative Global Media Sentiment	**F(3, 415) = 0.57** **Prob > F = 0.6329**	**F(3, 415) = 14.25** **Prob > F = 0.0000**
Business Cycle 5: Downtrend – Negative Global Media Sentiment	**F(3, 94) = 1.67** **Prob > F = 0.1790**	**F(3, 94) = 2.30** **Prob > F = 0.0827**

Table 4: Summary of Negative Global Media Sentiment in Business cycles

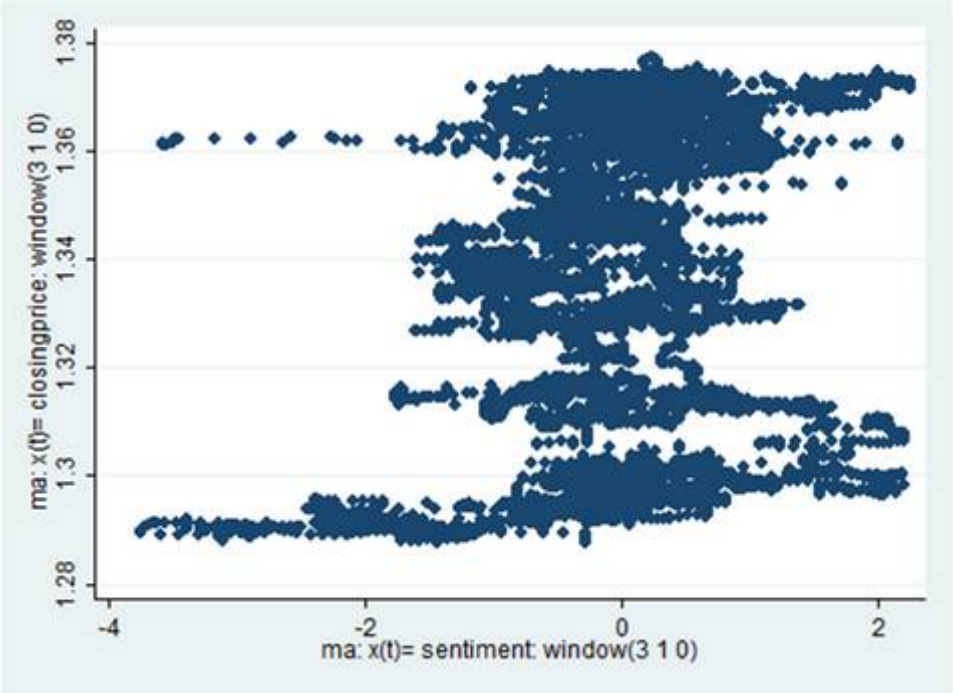
An absolutely similar situation appears when looking at the summary of negative global media sentiment in different business cycles. We see no causal relationship between the two variables in the first two business cycles, but later the influence of the Dow Jones Industrial Average price action on negative news sentiment becomes obvious. However, here too, the last business cycle shows no causal relationship. This is to conclude that global news sentiment, when we look at it on the cumulative level, appears to be influenced by market price action, but there is no significant influence observable when we split the database in two: into negative and positive values.

4.4 Financial Media and the EUR/USD Exchange Rate

The next research question asks: Does financial media content influence price action (the EUR/USD exchange rate) to a higher extent than general media sentiment? In order to answer this question, we look at the two different important sources of information online. The first is Reuters and the second is Bloomberg. The method of collecting news has already been described in the chapter above. In this subchapter, I will avoid further description of the methods used and simply note that contrary to the LexisNexis database, which was used for elaborating global media sentiment, the news from the financial media database were analyzed in “live” mode during the two month period on a minute by minute basis. Then, the

minute by minute sentiment data was compared with minute by minute EUR/USD exchange rates, where sentiment value always preceded the final closing price. The database provided three different outputs: communicative sentiment for both financial outlets, sentiment for Reuters only and sentiment for Bloomberg only.

First, let us look at the cumulative sentiment of both platforms. In the beginning, I would like to provide a very interesting graph of the sentiment/price relationship and only then move to the hypotheses tests.



Graph 43: Reuters/Bloomberg Cumulative Sentiment and EUR/USD Exchange Rate

At a first glance, we are unable to observe any tendency on this graph. In order to understand it, we have to take into the account the fact that we deal here with minute by minute sentiment and, hence, observe countless dots. Even smoothing it with a thirty minute moving average does not help. Secondly, we have to note that this graph is still very important if we look at it in comparison to the other graphs provided in the subchapters above. There is one significant difference between these charts. Previous charts from the first generation media systems have had mainly two central tendencies: first, they were moving between 2 and -2 points on the sentiment scale, and secondly the y had some bias. In the above sentiment chart of the second generation media systems, we observe only one tendency: sentiment concentrates around the zero point and shows no other recognizable

bias in any other direction. The obvious explanation would be to say that this is due to the reserved language of the financial media compared, say, to other media outlets of the first generation news delivery systems. It is actually no surprise that when performing the Granger-causality test we observe that both null hypotheses are confirmed. First, let us list them once again:

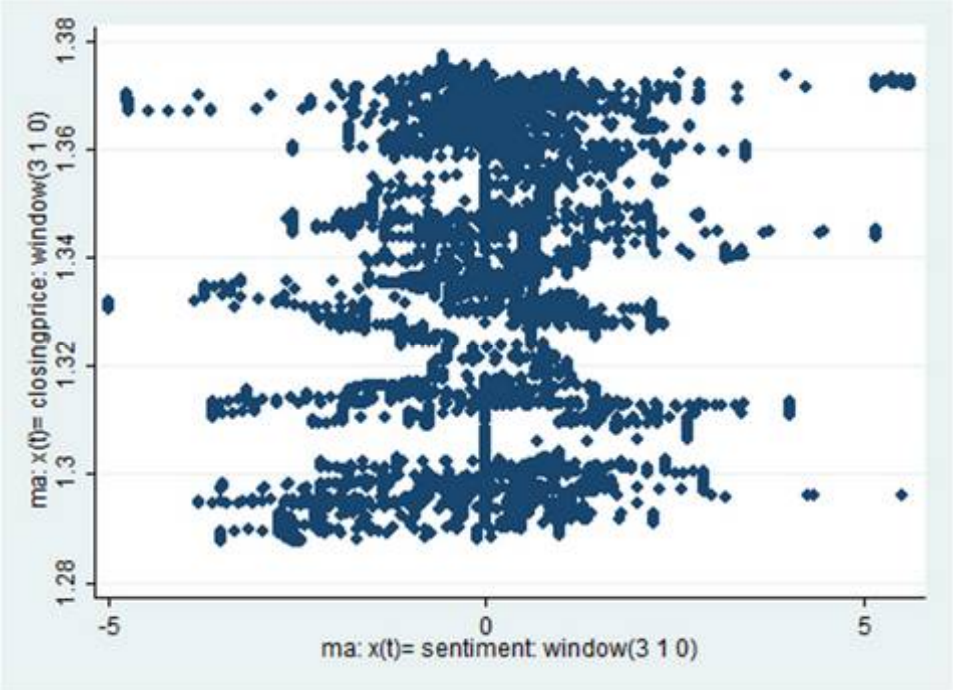
- **Test 1:** Cumulated online financial news sentiment does not Granger-cause price change in the EUR/USD exchange rate
- **Test 2:** Price change in the EUR/USD exchange rate does not Granger-cause the change in cumulated online financial news sentiment

In both of the tests, as said, the hypotheses are confirmed, indicating that there is no reciprocal influence of the two variables on each other.

As a next step, we have to split this second generation database into two parts. In the first part we should put the Reuters-only sentiment, and in the second part we should examine Bloomberg-only sentiment in order to see whether the sentiments on these platforms, independently of each other, have some effect on price action. First, let us look at the hypotheses in the Reuters sentiment database:

- **Test 1:** Reuters news sentiment does not Granger-cause price change in the EUR/USD exchange rates
- **Test 2:** Price change in the EUR/USD exchange rate does not Granger-cause the Reuters news sentiment change

Here, the situation is slightly different than it was in the case of the cumulative database. The hypothesis in the first test is rejected, indicating that news sentiment from the Reuters news database does not affect market price action. But the second test shows that Reuters news platform is strongly influenced by market price action on a 5 percent significance level.



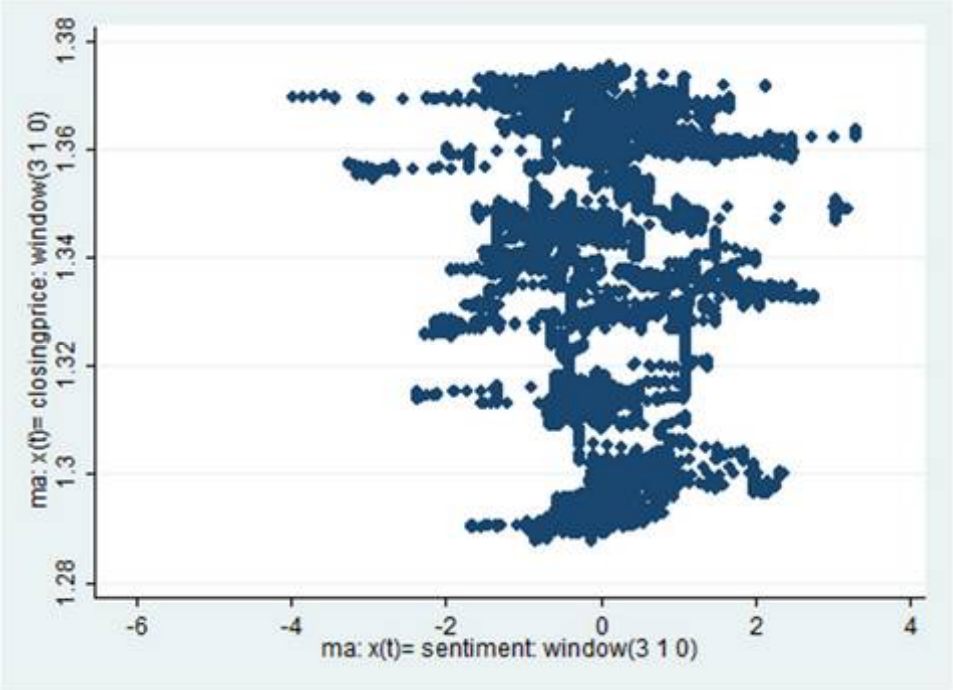
Graph 44: Reuters News Platform Sentiment and EUR/USD Exchange Rate

In the graph above, we observe only one major tendency: the concentration of sentiment around the point zero (neutral sentiment point), confirming the observation already seen in the previous cumulative sentiment chart.

A slightly different picture emerges when we look at Bloomberg sentiment. First, let us recall the null hypothesis of two Granger tests:

- **Test 1:** Bloomberg news sentiment does not Granger-cause price change in the EUR/USD exchange rate.
- **Test 2:** Price change in the EUR/USD exchange rate does not Granger-cause the Reuters news sentiment change.

Unlike the Reuters sentiment database, in this case we observe no relationship between the two variables. Both the first and the second hypotheses are confirmed, showing that there is no causal relationship between Bloomberg news sentiment and price action. Also, the graph provided below is different from that of the Reuters platform database. It shows a slight positive bias, but it is not enough for any statistically significant differences.



Graph 45: Bloomberg Online Platform Sentiment and EUR/USD Exchange Rate

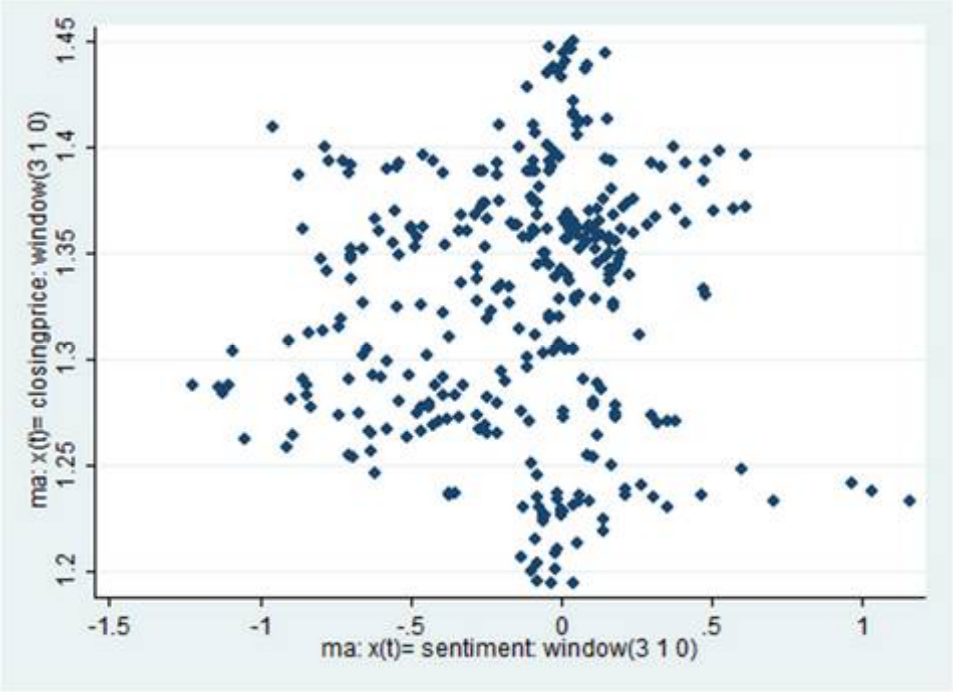
The results of the online platform investigation are not unambiguous. It would be no mistake to argue that here too market price action plays an important role for second generation news delivery systems and not vice versa. However, the impact of price change on news sentiment in second generation news delivery systems is much smaller than on the first generation news delivery systems.

4.5 Third Generation News Delivery Systems and Market Price Action

The additional source which has to be tested here is the content available only to subscribers. Such services are delivered by large media companies to different wealthy individuals and organizations. As an example of paid media content, we can name any service available to subscribers in an online or offline form from well known news outlets such as the *New York Times* or *Financial Times*. However, there are services, delivered by such organizations as Bloomberg and Reuters, which offer more advanced tools for news analysis. These companies offer online terminals to subscribers which deliver news, charts, and analysis in real time, minute by minute or even second by second. The question is whether such services provide information which would somehow affect investors' behavior

and, hence, market price action. For that, news from such terminals should be tested. In the context of my research, I test the Reuters 300 Xtra subscribers service. As such a service is quite expensive, it is mostly available only to wealthy individuals or organizations. In this research I used news from the terminal relevant to the EUR/USD exchange rate for the years 2009 and 2010. The news was cumulative and provided daily values. Cumulative news sentiment then was compared to the daily closing price of the EUR/USD exchange rate. The results, the details of which can be found in the last attachment of this thesis, attachment 22, are of crucial importance for major claims in this research. First, let us introduce the working hypotheses:

- **Test 1:** Paid financial media content does not Granger-cause price change in the EUR/USD exchange rate
- **Test 2:** Price change in the EUR/USD exchange rate does not Granger-cause Reuters news sentiment change



Graph 46: Reuters Xtra3000 News Sentiment and EUR/USD Exchange Rate

During the examination of these two hypotheses a new, unseen picture emerges. Here. for the first time in this research, we reject the null hypothesis in the first test, showing that the

Reuters Xtra300 news database has a strong influence on market price action. At the same time, in the second test, the null hypothesis is confirmed, indicating that market price has no statistically significant influence on Reuters Xtra3000 news sentiment.

	Test 1: Sentiment Granger-Causes Price	Test 2: Price Granger-Causes Sentiment
Cumulative Financial Media Sentiment	**F(3, 25549) = 1.44** **Prob > F = 0.2299**	**F(3, 25748) = 1.48** **Prob > F = 0.2175**
Reuters Financial Sentiment	**F(3, 25562) = 0.85** **Prob > F = 0.4673**	**F(3, 25763) = 4.17** **Prob > F = 0.0059**
Bloomberg Financial Sentiment	**F(3, 23839) = 0.82** **Prob > F = 0.4818**	**F(3, 24036) = 1.43** **Prob > F = 0.2324**
Reuters Xtra 3000 Financial Sentiment	**F(3, 323) = 6.09** **Prob > F = 0.0005**	**F(3, 323) = 1.64** **Prob > F = 0.1802**

Table 5: Second and Third Generation Financial Media Sentiment - Test Summary Page

The results show a high F value on the side of news media sentiment (F = 6.09) with high statistical significance, and a low F value on the media sentiment side with no statistical significance. This indicates that Reuters news sentiment in the platform Xtra 3000 contains news which causally affects market price action. Individual lag values provide more information on the matter. They indicate that news sentiment lag 1 is statistically significant at the 0.05 level, whereas other lags remain statistically insignificant. Furthermore, the results show that price lags have no statistical significance.

With this, it can be said that paid content and news media affect developments in the market to a higher extent than freely available financial media sites or the general media.

5 Conclusions – Third Generation Experience

At the beginning of this thesis, I looked at many different perspectives on mediatization, trying to clarify those perspectives and make this phenomenon accessible to quantitative research. Then I moved to the theories, which ostensibly do not have appear to anything to do with mediatization as it is conventionally understood among researchers in sociology. We looked at agenda setting theory and then concentrated our attention on framing as the main tool for mediatization "measurement." Later, we moved to issues of the media and politics and transitioned to the media and markets. I suggested looking at mediatization as the shift of the power away from any social institution to the media. I argued that by observing the strength of media frames we would know whether modern society is mediatized or not. Most importantly, I suggested that the mediatization of society cannot be observed in a straightforward way. In mediatized societies, information is or should be the most valuable asset one could own, and dispersing this access to all of society would jeopardize some individuals' standing, at least from a rational point of view. We looked at the writings of Joseph Stiglitz who wrote a lot about information asymmetry (Stiglitz 2001). I argued that information asymmetry is a main characteristic of a mediatized society. This advantage-disadvantage relationship can be seen in framing effects. The disadvantaged are affected by frames and the advantaged are the "inventors" of frames. At this point, I argued that effects discussed here could be best seen and measured on the financial markets, as they perfectly represent all informational efficiencies and inefficiencies in mathematical form. Therefore, I applied a quantitative content analysis with the aim of measuring three different frames in financial news in order to understand their effects on market price action. The idea behind this experiment was quite simple: If my theory of mediatized asymmetry is correct, we should be able to see different effects of differently framed news on market price action.

I classified media in three different forms. First, there is the general media which is read by majority of us on an everyday basis in print and/or in digitalized form;[22] second, there is specific digitalized media that was designed for a narrower audience, and third, there is the professional media that is only available to the wealthy and privileged groups. If my arguments proved to be right, then the third form of media outlets would prevail over the other two and readers of the first form of media outlets would be at a disadvantage.

[22] Here, I mean digital versions of newspapers and magazines, but not the online platforms.

In order to understand the effect of different sources on market price action, I utilized an auto-regressive model commonly referred as the Granger causality test and formulated nine different research question.

RQ 1: Does global media sentiment influence market price action (in our case, changes in the Dow Jones Industrial Average - DJIA)?

When I mention global media sentiment, I always refer to first generation news delivery systems. The first database was created in such a way that by examining it we would be able to answer the first research question. The Granger causality test provides quite a clear picture on that matter: we observed that there was no effect whatsoever. That is, we could not see global media sentiment affecting price action on the Dow Jones Industrial Average; on the contrary, we noticed that developments in the Dow Jones Industrial Average greatly affected the sentiment of first generation media systems. It is obvious that journalists and analytics were greatly affected by market prices, and that traders on the floor were ignoring the sentiment of the magazines and journals altogether.

I argue in this thesis that with increasing mediatization, the speed of news delivery to the end user increases news effects. That is, the faster the news delivery the greater its effect on the end user. Therefore, the test results from the first generation news delivery systems database did not come as a surprise. A very high score of F was unexpected.

We modern citizens of the globalized world society receive a great amount of information on daily basis. We are informed about everything that happens anywhere. The feeling of being informed comes mainly from our daily consumption of news delivered from first and second generation news delivery systems. However, being informed does not mean that we truly can use the information to our advantage. As we saw, at least in financial terms, the information we receive from first generation news systems is useless. The tests show that if we first look at the historical table of the Dow Jones Industrial Average we can with high probability guess what today's media will write about it. Contrary to that, if we look at the analysis of the developments in the Dow Jones Industrial Average in some sources coming from third generation media systems, we will fail to make reasonable predictions about tomorrow's prices.

RQ 1.1: Does positive global media sentiment influence market price action (DJIA) in a stronger manner than negative media sentiment?

The database created based on first generation news delivery system sources allowed us to look at positive news separate from negative news. I particularly wanted to understand if, by any chance, positive news has real influence on market price action. As the test results of the statistical analysis show, this is not a case. Positive news from first generation media systems is as strongly affected by price action as is global news sentiment. According to my research, the media tend to develop a positive attitude towards the U.S. economy when the price goes up.

RQ 1.2: Does negative global media sentiment influence market price action (DJIA) in a stronger manner than positive media sentiment?

Research question 1.2 is the opposite of research question 1.1. Here, I wanted to see whether negative news coming from first generation news delivery systems sources had a greater effect than positive news or global media sentiment. The test showed that negative news items have no significant effect on price action, and they confirm the already established evidence in research question 1 and research question 1.1. Like positive and global media sentiment, negative media sentiment is strongly affected by developments on the market and by price change.

All in all, we can conclude that negative news from the first news delivery systems are highly influenced by the Dow Jones Industrial Average price changes. Splitting the global media sentiment database into positive and negative segments does not bring any significant improvement.

RQ 2: Can we observe different global media sentiment effects on market price action (DJIA) in different business cycles?

In order to answer research question 2, I split the global media sentiment database into five parts according to the financial cycles of the last decade. In this last decade, we have had two very long uptrends and three downtrends. One downtrend out of these three was very short-lived (the downtrend for 1998). The second downtrend lasted for long three years. The

third downtrend was also relatively short compared to the second one and lasted only for one year, between 2008 and 2009. At the same, this last downtrend has had the strongest negative impact on the U.S. economy. According to my tests, surprisingly, there was no causal relationship between the two variables. Sentiment did not affect price, but at the same time, price did not affect sentiment. The situation changed in the last three business cycles. Journalists and analysts started to look at prices before forming their opinions.

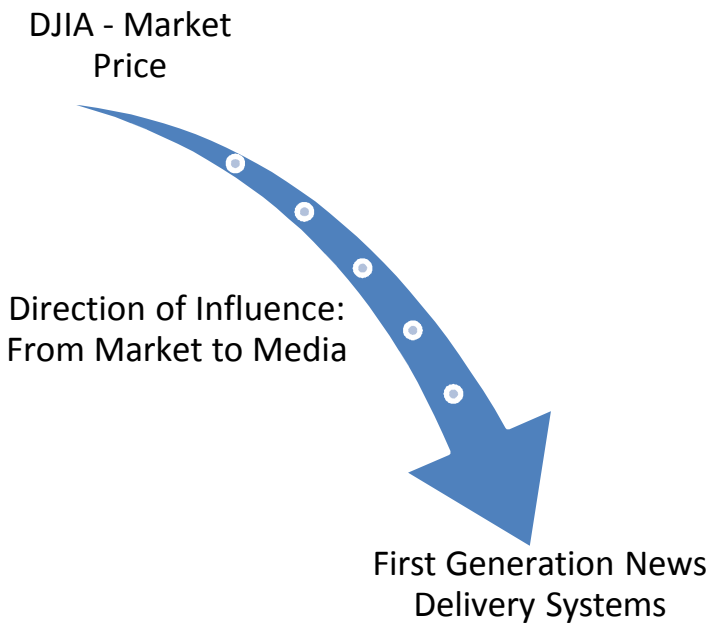
RQ 2.1: Can we observe different positive global media sentiment effects on market price action (DJIA) in different business cycles?

Research question 2.1 resembles research question 1.1. Here too the positive global media sentiment database is split into five parts in order to fit five business cycles. Here, I wanted to see whether positive news has a different impact on price action depending on where we stand in financial terms. It might be that positive news is more effective during an economic downturn but not so effective during an economic uptrend, or vice versa. According to my findings, there no such pattern is detectable. Independently of any business cycle, positive media has no influence on market price action. At the same, the effect of price change on positive global media sentiment is less than on cumulative global media sentiment. Only in one business cycle, namely during the uptrend between 2003 and 2008, did the positivity of the news depend on market price action. The results show that during the downtrend of 2000 – 2003, the effect of price change on media sentiment was statistically significant on the 0.1 level.

RQ 2.2 Can we observe different negative global media sentiment effects on market price action (DJIA) in different business cycles?

Research question 2.2 resembles research question 1.2. Here, we split negative global media sentiment into five parts according to the business cycles. Here too, we cannot prove that negative media mood affects price change depending on the business cycles. Also in this case, price has a statistically significant effect on negative media sentiment only in two business cycles; that is, during the 2000—2003 downtrend and during the 2003—2008 uptrend.

All in all, we can argue that the influence of market price action increases in time. The first business cycle we observed was in 1998. At that time, there was no causal influence found. However this changed later with price increasingly influencing global media sentiment.



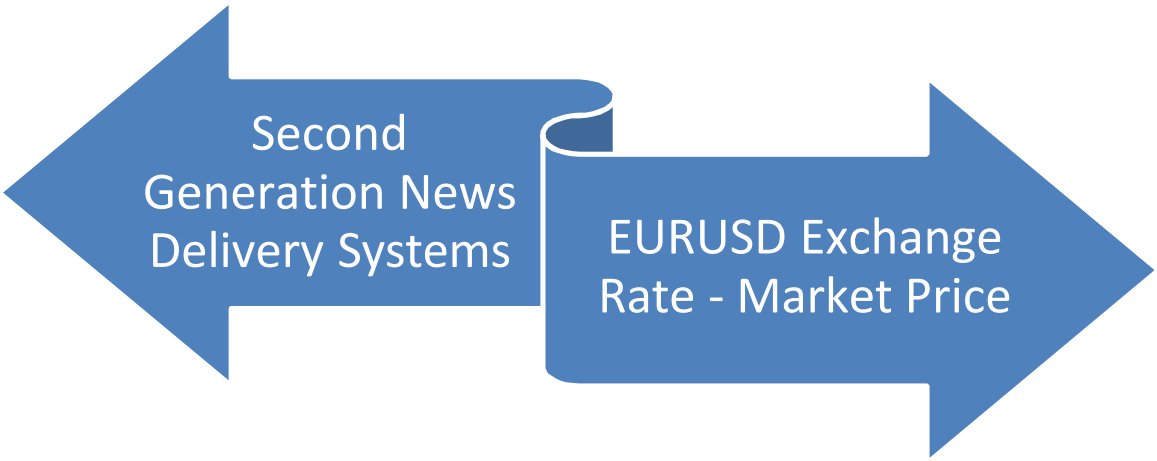
Graph 47: Visualizing effects - First Generation News Delivery Systems

RQ 3: Does online financial media content influence price action (the EUR/USD exchange rate) to a greater extent than general media sentiment?

In order to answer research question 3, I turned my attention to the database which contained news from second generation news delivery systems. Here, also the price database was changed. Instead of looking at the Dow Jones Industrial Average, I examined the Euro/US Dollar exchange rate. The findings from the statistical tests are intriguing. They show that the influence of price on news media sentiment diminishes, and in the case of cumulative news sentiment, vanishes altogether. The media has no power to influence exchange rate fluctuation. All in all, we can state that there is no causal relationship observable between the news sources of second generation news delivery systems and price action.

RQ 4: Are there differences observable within financial media titles in terms of their influence on market price action (the EUR/USD exchange rate)?

The cumulative news media sentiment from second generation news delivery systems united two media sources: Reuters and Bloomberg. I wanted to test the effect of these sources combined (in research question 3) and then separate from one another. It was intriguing to find out which media source was more affected by price change or which media source affected price change to the higher extent. The test showed no causal relationship between Bloomberg news media sentiment and the Euro/US Dollar exchange rate. I did observe that Reuters financial media is affected by the exchange rate fluctuation.



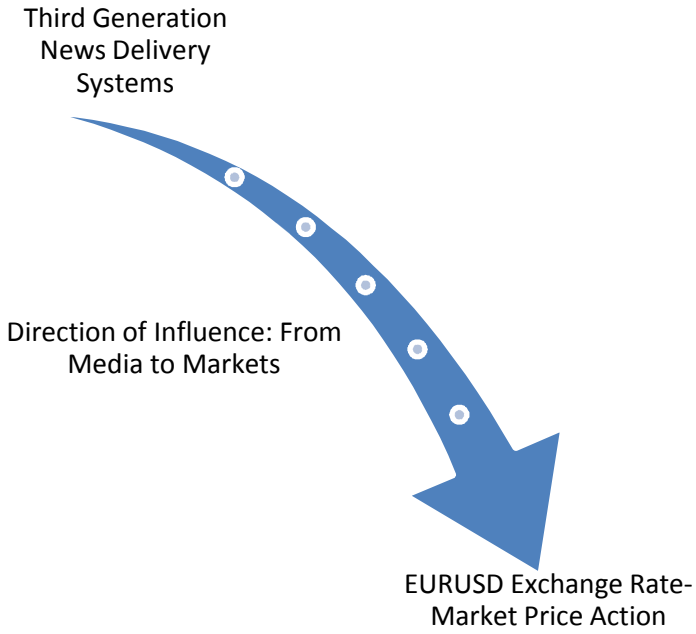
Graph 48: Visualizing Effects: Second Generation News Delivery Systems

In sum, I observe that the influence market price exerts on news sentiment is far greater in first generation news delivery systems than in second generation news delivery systems. Taken cumulatively, no influence at all is observable for second generation news delivery systems.

RQ 5: Does paid financial media content influence market price action (the EUR/USD exchange rate) to a greater extent than public financial media content and public global media content?

In order to answer this fifth research question, I utilized a database coming from third generation news delivery systems. In this database we had news from the Reuters Xtra 3000 platform. Statistical tests showed a very important turn in our observation. For the first time during the entire examination, price did not affect the news, but the news affected price

change. With this test, I could confirm that the effect of third generation media systems on the price action was very high in statistical terms.



Graph 49: Visualizing effects - Third Generation News Delivery Systems

With this finding we could empirically observe information diffusion asymmetry, a model developed in the theoretical part of this thesis. Such mediatization asymmetry leads to the inefficient markets and, at least partially, to inefficient societies. It is beyond the scope of this research to fully address the question of whether such asymmetry is good or bad. I personally fully agree with Joseph Stiglitz that such imbalances could cause major problems in politics, economic, and other realms of life. But how we understand and interpret the asymmetries is partially a matter of perception and partially a matter of taste. The fact is that at any given moment, there is no way to eradicate such imperfect occurrences completely. Even more, as shown in this research, the gap between those informed and those thinking they are informed (with the high probability that I am part of this last large group of people) is widening. The speed of information delivery threatens even those who possess the means of accessing the information. The threat is twofold: first, the amount of delivered information is so large that no human can manage to fully comprehend it, and second, even if there is a tool to process such information, one can fail to efficiently distinguish relevant from non-relevant news. The solution to such a problem should be seen in new ways of news processing which are suitable to the new ways of information delivery.

Further, such methods and instruments should be accessible to large parts of society. This will at least reduce mediatization asymmetry, if not eradicate it completely.

5.1 Information Diffusion Asymmetry

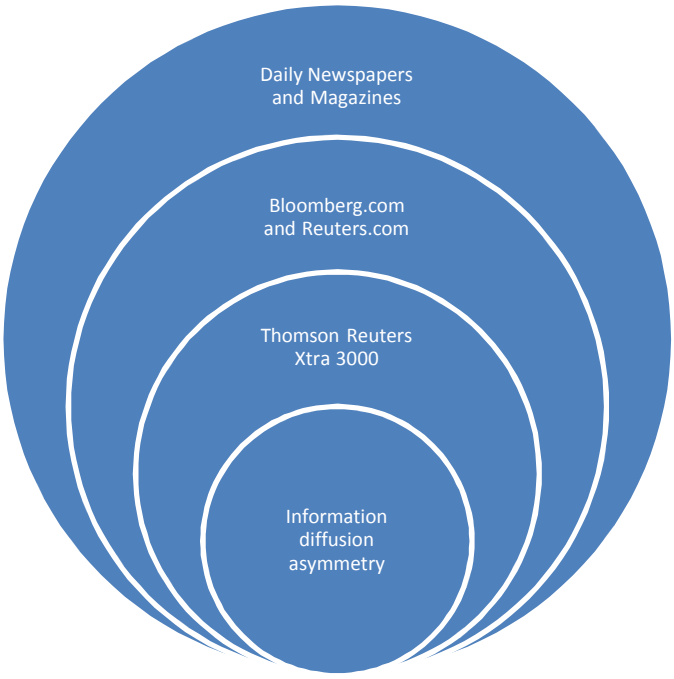
In this subchapter, I would like to turn my attention to the information diffusion model which I introduced earlier in the research. In the present study, I tested the arguments which led us to the development of the model in empirical terms. The data we analyzed in the methodological part came from three different generations of news delivery systems. Our data can be allocated in this way:

- First generation news delivery systems: data obtained from various global media outlets, newspapers, and magazines.
- Second generation news delivery systems: here, we tested two major sources: the Bloomberg website and the Thomson Reuters website.
- Third generation news delivery systems: here we processed information obtained from Thomson Reuters Xtra 3000 service, a paid subscription service.

My major goal was to test the forecasting ability of news obtained from different generations of news delivery systems in order to find out whether this information would be useful for integration into a decision making model for news processing. The question I asked can be reformulated like this: Is the decision making model improved when we put new data (that is in our case the news) in the model, and hence is the information diffusion loop usable?

Statistical tests performed in this research indicated that the first and second generation models have had very limited forecasting ability, if any. That is, the information at most people's disposal is barely usable for improvement of the information diffusion loop. Third generation news delivery systems, however, improved the model's functioning significantly. With this we can argue that the information diffusion loop as it was presented in the theoretical part of the study was correct, at least in statistical terms. That is, the tests confirm that we face the problem of information diffusion asymmetry, which creates

advantages for a certain and rather small group of end users and disadvantages for a large part of society which still uses second generation information delivery systems.



Graph 50: Different Information Delivery Systems in the Information Diffusion Loop

I have to stress here once again: the most important point here is that the rapidly increasing speed of information delivery creates unseen opportunities for a few to go through the information diffusion loop very quickly, whereas others who are excluded from the system are in an utterly disadvantageous position.

The question we might ask here is: between 1980 and 2000, when the development of Internet had just begun, it was only a few who could use the new form of communication to their advantage. Today, around 80 percent of the population in industrialized countries are Internet users and the number of users in developing countries is rapidly increasing. That is, like third generation information delivery systems, second generation information delivery systems started out by being accessible only to a selected few. Today, as shown in various graphics also in this study, content generation in these second generation systems is in the hands of “normal” users, and the era of dominance of big companies has found its end or, at least, this dominance is diminishing very rapidly. This might be case also for third generation information delivery systems. Today, they are accessible only to the wealthy, but tomorrow normal users can be ordinary participants in these systems. I personally would welcome such

a development, as this would be a direct way of eradicating the news diffusion asymmetry problem, but there are several important factors, which in my opinion will make this task very hard to accomplish. Let me list these factors below.

One of the major characteristics of second generation news delivery systems is that the content is or could be potentially produced by many. As we saw, in practical news, the modern Internet is dominated by user-oriented content generating systems. That is, content production cost is very low. Everyone is potentially a content producer (the chances are high that you too have produced some newsworthy content on some social networking site. I do so on a daily basis). Unlike second generation information delivery systems, third generation information delivery systems must be produced by means which are extremely costly. Second generation information production systems have very low quality control standards. Quality control is handed over the end user, who builds filters according to past experiences with the sources in question[23]. Accordingly, it is the end user who decides, based on his or her past experience, which content is trustworthy in the first place and which is not. In third generation delivery systems, the role of filtering is delegated to the channel. That is, the channel is responsible to deliver trustworthy content to the end user. The end user assumes that information received from the channel is already fully tested and can be used in the news diffusion loop without any reservations. Otherwise, the functioning of third generation information delivery systems would not be possible; these systems would collapse. Hence, the entire function of checking information quality is on the shoulders of the information channel, which has to check each time that the information source is reliable. Additionally, the channel must perform this task in the shortest possible time in order to ensure the highest speed of information delivery to the end user. Hence, the cost of information production in third generation information delivery systems, unlike second generation news delivery systems, is extremely high. To this is added the costs of the infrastructure which must be maintained in order to ensure seamless functioning of the entire system and the highest speed of information transmission. Whereas some social network sites could easily afford to suspend some services for several minutes or even several hours, this would amount to disaster in third generation information delivery systems. Hence, the costs of information delivery will remain high for third generation information delivery systems.

[23] For more information, please revisit the subchapter on Trust in this research

These costs are transmitted to the end users; otherwise the system will fail to last long. The end user, at the same time, expects some immense advantage from the information received if they are ready to pay such a large amount of money for the service. And, one can be absolutely sure, these end users are ready to put this advantage into practice. Hence, the expectation that third generation news delivery systems will become available to the "normal" end user and that the second generation information delivery systems users will turn slowly to third generation information delivery users should be kept low.

The next question we need address here is: Is the problem of news diffusion asymmetry potentially very dangerous to the existing social order? The short answer would be no, but this does not mean that the problem should not be addressed. It has to be noted that information diffusion asymmetry has existed probably since the humans started to develop some form of cooperation with each other. The importance of having information earlier than the opponent does has been well understood in human history. The problem we are facing at the moment is the increasing severity of the gap which is emerging out of this problem between those who have information early on and those who access this information with significant delay.

I have to stress here once again: the most important point here is that the rapidly increasing speed of information delivery creates unseen opportunities for a few to go through the information diffusion loop very quickly, whereas others who are excluded from the system are in an utterly disadvantageous position.

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5.2 The Consequences

It is obvious that development of third generation data delivery systems should be seen through the prism of the mediatization phenomenon. If the process or state of mediatization as we define it in this research, is observable, then it is primarily observable in the increasing speed of news delivery.

There is nothing wrong with this process unless speed delivery asymmetry leads to the creation of large social gaps and further disrupts the social system, which is already under the severe stress of inequality.

I argue that the establishment of second generation systems was a positive step towards social development, as it encouraged higher participation of end users in the content creation process. I think this despite its drawbacks, such as the potential decline of the quality of the content as untrained non-professionals create content and there is a lack of sophisticated quality control mechanisms. In the face of this, the introduction of third level information systems should be seen as return to quality. In third generation news delivery systems we have a much higher demand for fact checking and quality control. At the same time, the data flow to the end user in third generation information delivery systems remains at high, practically unmanageable levels. The only aspect that is changed from second to third generation news delivery systems is the diversity of "content creators." That is, before information is delivered to the end user, it goes through the "professional" controlling filter. This, on the one hand, can be a positive development in some cases, but it is certain that such filters in third generation information delivery systems also negatively affect content diversity.

However, incorporated filters in third generation news delivery systems are not as big a problem as it might appear at first glance. The user of this type of news delivery system can easily become the user of second generation information delivery systems too and with this access more diverse content. The biggest and most challenging problem is information delivery asymmetry which is created by different speeds of information diffusion between the two different generation types.

As already discussed above, the potential problems which could emerge out of this asymmetry are very severe, and the solutions at hand few. If the mediatization process continues, and according to all evidence it will, then the gap of the speed of news diffusion between the two generations of information delivery systems will certainly grow. Accordingly, the gap between those who are informed faster and informed later will widen in decades to come.

One solution to the problem could be to exploit the advantages of the second generation information systems. There is still information asymmetry in favor of the second generation systems. The speed asymmetry emerges out of two different types or models which these two systems utilize and brings us back to the question of content diversity once again. The

creators of content in second generation information delivery systems are many and spread around the globe. The professional content creators for third generation news delivery systems are few. The speed of news delivery is incredibly high in this system when the information (sometimes called “fundamental information” in finance) is already expected to be announced. At the same, many times in our mediatized life something extraordinary happens, and this turns out to be breaking news. It is evident that in spreading unexpected breaking news, social media are unbeatable. All the rumors of some unexpected occurrences come first through Twitter and Facebook, and only then are they spread in the professional media outlets. This phenomenon was widely evident during the so-called Arab uprisings in 2011 and 2012. However, it is still the professional media outlets that are tasked with checking, confirming, or ignoring the news available on the social networks and then delivering it to an even larger public.

The eminent question we face here is: Is the first generation information delivery system extinct in the face of increasing concurrence from the second and third generation systems? This question is hard to answer. If such extinction occurs, then this process will probably last for decades. Maybe, it would be more proper to speak not about the disappearance of first generation news delivery systems but about their consequent fusion with second and third generation technologies. It has to be noted that all systems will benefit from such integration. First generation news delivery systems have qualities which are necessary for the existence of tools which enable us to check the quality of delivered information. Third generation news delivery systems have their roots in first generation systems; hence, it has inherited all its good and bad sides aspects.

The high costs of access to third generation news delivery systems will remain a significant problem in the near future. Hence, there will be those who profit from the system while the majority are disadvantaged. This is a problem which cannot the ignored if we are determined to reduce inequalities in society. One solution to this problem would be the involvement of public organizations in creating third generation news. Today, the entire process from obtaining news to delivering it to the end user is solely in the hands of commercial organizations, which, following the logic of the market, are interested in capitalizing on this very valuable asset. The entrance of public organizations here will free us from this commercial logic. It will enable us to develop solutions for the problems which we

face in third generation news delivery systems and second, reduce the access price to this good.

Public (non-profit) involvement in the production of public goods is sometimes seen as something to be avoided by all means. It is true that the introduction of non-profit structures into the free market leads to considerable problems. Commercial companies find it hard to compete with publicly financed organizations with their large amounts of resources. Public companies, in contrast to commercial ones, have the freedom not to be profit-oriented. This is an advantage in some cases. At the beginning, the development of innovative solutions is costly, and the probability that it will bring high profits immediately is very low. Hence, the generous financial means of public organizations can be used for the development of solutions to existing problems which would be impossible in the purely commercial market. On other hand, the same logic can cause public organizations to perform badly. The absence of commercial pressure can lead to the development of ailing products for which no demand exists and no demand can be created. Additionally, public interference in commercial activities will lead to the imminent decline of market shares for public companies. This will, most probably, lead to the decline of revenue and reduce the amount of resources they have on hand to invest in researching innovative solutions and products. To put it simply, public involvement can lead to change in the direction of research, but this change is sometimes, for good and sometimes for ill. It is very difficult to provide hard evidence that public involvement is generally negative; at the same it is impossible to prove the contrary either. We already have evidence about public involvement in first and second generation news delivery systems in many countries. Switzerland and the United Kingdom would be good examples of public financing in national and international broadcasting. Despite many arguments pro and against the existence of the British Broadcasting Company (largely known as the BBC), the jury is still out as to whether its activity is good or bad for the independent media. However, it is matter of fact that the existence of such structures is a common way to address problems in first and second generation news delivery systems and, to my knowledge, they never caused any irreparable damage to social or free market structures.

In decades to come, the establishment of third generation news delivery structures will be and ongoing and ever-strengthening process. Today, the problems caused by news diffusion asymmetry created by the differences between second and third generation news delivery

systems seem to be negligible. It is, however, only a matter of time until we will come to the point where the problem cannot be ignored. The earlier solutions for the problem are found, the easier will be their implementations and the lower will be the damage caused by this particular asymmetry.

5.3 A Final Note

My first impression when I arrived in Switzerland in the very beginning of the 21st century can be described with only one word: "Metropol." For me "Metropol" is and was the synonym of mediatization long before my attempts to understand the phenomenon in scientific terms. Chances are high that readers of this thesis, even permanent residents of Switzerland, do not remember or do not know what "Metropol" is. This is a sign of mediatization. Many would think that I am speaking about a hotel and would Google it to find out what am I talking about. You would be wrong. This would be another confirmation of the high state of mediatization we are experiencing. "Metropol" was everywhere and with everybody when I first arrived in Zurich. Today, we hardly remember something that was ubiquitous ten years ago. "Metropol" was a free newspaper which was in press from 1999 to 2004 and due to some to mediatization related reasons, died very suddenly. Everyone around me was reading it. I was reading it too and had a feeling that I was informed about all the major issues on the planet in a very up to date way. The "Metropol" disappeared a long time ago, but the feeling that we are informed and up to date about nearly everything on the planet and even beyond it remains with us. This feeling is created by the increasing mediatization of our society. In my study, we saw that the feeling does not really correspond with reality and that there are a few out there who are much better equipped with better information and with greater speed of information transmission than we are.

In this thesis, many very difficult concepts were brought under one roof. It is up to the reader's judgment to decide whether this effort was successful and to what extent. Whatever the outcome, the attempt was sincere. I attempted to develop a conception of mediatization which would make the phenomenon measurable. Beyond all fancy words, complicated definitions, and scientific formulations, there is a simple idea behind all of this: the idea is that mediatization describes a state of a society or societies where many things, if

not any things, depend on media logic and are handled by media logic. This state, I believe, can be measured by many different signs. We looked at several of them in order to decide whether our hypothesis, that our society is highly mediatized, was true. I am convinced that one of the major measures of a phenomenon is its effects. By looking at media effects we can easily understand the power or powerlessness of media outlets and of entire media systems. Effects, on the other hand, can be best observed by looking at frames, and this is what we did.

Further, I argued that the existence of three different information delivery systems is one of the examples of the ongoing mediatization process. Increasing mediatization speed and information delivery is significant. Those informed earlier possess a huge advantage over those informed later, and the advantages will grow further as time gap widens

Because effects created by information diffusion asymmetry are hidden from our daily experience, social awareness of it is low. However, increasing mediatization will lead to the information diffusion asymmetry to widen further and, hence, create unfair advantages for privileged members of society. It is only a matter of time until the problem will become so widespread and threatening that neither policymakers nor civil society activists can deny its existence. The power third generation information delivery systems have over our minds is immeasurable, and its control and regulation is a major responsibility of any functioning society.

As was said above, the introduction of third generation news delivery systems created not only problem of news diffusion asymmetry but also the problem of information comprehension. It is not possible for humans to handle even one percent of the information potentially available to us and delivered through third generation systems. Hence, a wealth of news remains ignored. In order to make this information accessible to humans, we need new ways of news processing such as are described in this research. Technical applications give us the potential power to handle the data available and use it to our advantage. At the same time, this nearly unlimited potential of machines creates a direct threat that access to this wealth of information will remain open to only the few who are able to pay for it. This, I argue, should not happen. The advantages of new ways of news processing should benefit the entire social structure. Therefore, alongside with the development of sophisticated

technical solutions, proper regulation and public involvement is key. Only thus can we turn the threats of increasing mediatization into opportunities.

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Attachment: Statistical Outputs

Number of observations = 1019
F (6, 1012) = 22539.24
Probability > F= 0.0000
R-squared = 0.9926
Adjusted R-squared = 0.9925
Root MSE = 124.64

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	.9731668	.0309001	31.49	0.000	.9125313 1.033802
Price Lag 2	.0268194	.0420976	0.64	0.524	-.0557891 .1094279
Price Lag 3	-.0030301	.0307187	-0.10	0.921	-.0633097 .0572494
Sentiment Lag 1	.3775598	6.412139	0.06	0.953	-12.20505 12.96017
Sentiment Lag 2	-.5800621	6.470288	-0.09	0.929	-13.27678 12.11665
Sentiment Lag 3	-5.300686	6.313333	-0.84	0.401	-17.68941 7.088036

F (3, 1012) =0.27
Probability > F = 0.8465

Number of observations = 1019
F (6, 1012) = 95.89
Probability > F = 0.0000
R-squared = 0.3625
Adjusted R-squared = 0.3587
Root MSE = .58367

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.1639391	.030027	5.46	0.000	.1050168 .2228613
Sentiment Lag 2	.102006	.0302993	3.37	0.001	.0425494 .1614626
Sentiment Lag 3	.1356151	.0295643	4.59	0. 000	.0776008 .1936294
Price Lag 1	.0004588	.0001447	3.17	0.002	.0001749 .0007428
Price Lag 2	.0000953	.0001971	0.48	0.629	-.0002915 .0004821
Price Lag 3	-.0003932	.0001439	-2.73	0.006	-.0006755 -.0001109

F (3, 1012) =37.18

Attachment 1 Granger Causality Test for Media Sentiment Dow Jones Industrial Average: 1998 – 2009

Number of observations = 1019
F (6, 1012) = 22536.82
Probability > F= 0.0000
R-squared = 0.9926
Adjusted R-squared= 0.9925
Root MSE= 124.65

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	.9734169	.0308578	31.55	0.000	.9128642 1.03397
Price Lag 2	.0277344	.0421039	0.66	0.510	-.0548865 .1103552
Price Lag 3	-.0036313	.0306942	-0.12	0.906	-.0638629 .0566002
Sentiment Lag 1	-1.86774	6.674004	-0.28	0.780	-14.96421 11.22873
Sentiment Lag 2	-2.331374	6.772589	-0.34	0.731	-15.6213 10.95855
Sentiment Lag 3	-2.119046	6.695127	-0.32	0.752	-15.25697 11.01887

F (3, 1012) =0.23
Probability > F = 0.8721

Number of observations = 1019
F (6, 1012) = 193.46
Probability > F = 0.0000
R-squared = 0.5342
Adjusted R-squared = 0.5315
Root MSE = .55409

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.2034633	.0296677	6.86	0.000	.145246 .2616806
Sentiment Lag 2	.222866	.030106	7.40	0.000	.1637887 .2819432
Sentiment Lag 3	.2064141	.0297616	6.94	0. 000	.1480125 .2648156
Price Lag 1	.0003439	.0001372	2.51	0.012	.0000747 .000613
Price Lag 2	-.0000772	.0001872	-0.41	0.680	-.0004445 .0002901
Price Lag 3	-.000134	. 0001364	-0.98	0.326	-.0004017 .0001338

F (3, 1012) =24.58
Probability > F = 0.0000

Attachment 2 Granger Causality Test for Positive Media Sentiment and Dow Jones Industrial Average: 1998 – 2009

Number of observations = 1019
F (6, 1012) = 22538.58
Probability > F = 0.0000
R-squared = 0.9926
Adjusted R-squared = 0.9925
Root MSE = 124.64

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	.9718341	.0308789	31.47	0.000	.9112401 1.032428
Price Lag 2	.0278451	.0421171	0.66	0.509	-.0548018 .110492
Price Lag 3	-.0040194	.0306751	-0.13	0.896	-.0642135 .0561746
Sentiment Lag 1	4.73644	8.363117	0.57	0.571	-11.6746 21.14748
Sentiment Lag 2	3.458466	8.291142	0.42	0.677	-12.81133 19.72826
Sentiment Lag 3	-5.269086	8.121902	-0.65	0.517	-21.20678 10.66861

F (3, 1012) =0.26
Probability > F = 0.8535

Number of observations = 1019
F (6, 1012) = 89.77
Probability > F = 0.0000
R-squared = 0.3474
Adjusted R-squared = 0.3435
Root MSE = .43735

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.2731088	.029345	9.31	0.000	.2155248 .3306927
Sentiment Lag 2	.2051842	.0290924	7.05	0.000	.1480958 .2622725
Sentiment Lag 3	.1975705	.0284986	6.93	0. 000	.1416474 .2534935
Price Lag 1	.0000696	.0001083	0.64	0.521	-.000143 .0002822
Price Lag 2	.0001977	.0001478	1.34	0.181	-.0000922 .0004877
Price Lag 3	-.0002995	.0001076	-2.78	0.005	-.0005107 -.0000883

F (3, 1012) =5.95
Probability > F = 0.0005

Attachment 3 Granger Causality Test for Negative Media Sentiment and Dow Jones Industrial Average: 1998 – 2009

Number of observations = 39
F (6, 32) = 86.18
Probability > F = 0.0000
R-squared = 0.9417
Adjusted R-squared = 0.9308
Root MSE = 135.43

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	1.028319	.1731143	5.94	0.000	.6756966 1.380941
Price Lag 2	-.3352993	.2782431	-1.21	0.237	-.9020621 .2314634
Price Lag 3	.254865	.2161685	1.18	0.247	-.185456 .6951859
Sentiment Lag 1	57.55201	41.93735	1.37	0.180	-27.87158 142.9756
Sentiment Lag 2	-7.691279	30.18771	-0.25	0.801	-69.18163 53.79908
Sentiment Lag 3	.6232095	31.30541	0.02	0.984	-63.14383 64.39025

F (3, 32) =0.65
Probability > F = 0.5902

Number of observations = 39
F (6, 32) = 1.53
Probability > F = 0.2005
R-squared = 0.2228
Adjusted R-squared = 0.0771
Root MSE = .583

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.0604383	.1805345	0.33	0.740	-.3072984 .4281751
Sentiment Lag 2	-.1162473	.1299539	-0.89	0.378	-.3809548 .1484602
Sentiment Lag 3	.0349138	.1347655	0.26	0.797	-.2395946 .3094221
Price Lag 1	.000911	.0007452	1.22	0.230	-.0006069 .002429
Price Lag 2	-.0005113	.0011978	-0.43	0.672	-.0029512 .0019285
Price Lag 3	.0000974	.0009306	0.10	0.917	-.0017982 .0019929

F (3, 32) =2.16
Probability > F = 0.1118

Attachment 4 Granger Causality Test for Media Sentiment and Dow Jones Industrial Average - downtrend: 1998

Number of observations = 78
F (6, 71 = 553.01
Probability > F = 0.0000
R-squared = 0.9791
Adjusted R-squared= 0.9773
Root MSE = 112.61

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	.937301	.1207726	7.76	0.000	.6964874 1.178115
Price Lag 2	.2336877	.1897656	1.23	0.222	-.1446942 .6120695
Price Lag 3	-.2083422	.1353286	-1.54	0.128	-.4781798 .0614955
Sentiment Lag 1	23.17775	22.3424	1.04	0.303	-21.37173 67.72722
Sentiment Lag 2	17.93403	21.2125	0.85	0.401	-24.3625 60.23056
Sentiment Lag 3	-.3272004	19.62811	-0.02	0.987	-39.46454 38.81014

F (3, 32) =0.49
Probability > F = 0.6898

Number of observations = 78
F (6, 71) = 1.30
Probability > F = 0.2688
R-squared = 0.0989
Adjusted R-squared = 0.0228
Root MSE = .60239

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	-.1780671	.1195205	-1.49	0.141	-.4163842 .06025
Sentiment Lag 2	-.1160464	.1134761	-1.02	0.310	-.3423113 .1102186
Sentiment Lag 3	.0691128	.1050004	0.66	0.513	-.1402522 .2784777
Price Lag 1	.0009068	.0006461	1.40	0.165	-.0003814 .002195
Price Lag 2	-.0003229	.0010151	-0.32	0.751	-.0023471 .0017012
Price Lag 3	-.0003516	.0007239	-0.49	0.629	-.0017951 .0010919

F (3, 71) =2.39
Probability > F = 0.0758

Attachment 5 Granger causality test for media Sentiment and Dow Jones Industrial Average - uptrend: 1998 – 2000

Number of observations = 377
F (6, 370) = 3783.98
Probability > F = 0.0000
R-squared = 0.9840
Adjusted R-squared = 0.9837
Root MSE = 127.61

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	1.046877	.0531212	19.71	0.000	.94242 1.151335
Price Lag 2	-.0389485	.0717158	-0.54	0.587	-.1799701 .1020732
Price Lag 3	-.0180343	.0528105	-0.34	0.733	-.1218806 .085812
Sentiment Lag 1	-.4480059	12.24794	-0.04	0.971	-24.53231 23.6363
Sentiment Lag 2	8.264566	12.00096	0.69	0.491	-15.33407 31.86321
Sentiment Lag 3	-2.36192	11.7127	-0.20	0.840	-25.39372 20.66988

F (3, 370) =0.17
Probability > F = 0.9183

Number of observation = 377
F (6, 370) = 3 9.78
Probability > F = 0.0000
R-squared = 0.3921
Adjusted R-squared = 0.3823
Root MSE = .50666

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.1601742	.0486286	3.29	0.001	.0645512 .2557972
Sentiment Lag 2	.1751593	.047648	3.68	0.000	.0814646 .2688541
Sentiment Lag 3	.1866711	.0465035	4.01	0.000	.0952269 .2781154
Price Lag 1	.0005354	.0002109	2.54	0.012	.0001206 .0009501
Price Lag 2	.0003382	.0002847	1.19	0.236	-.0002217 .0008981
Price Lag 3	-.0007055	.0002097	-3.36	0.001	-.0011178 -.0002932

F (3, 370) =15.33
Probability > F = 0.0000

Attachment 6 Granger causality test for media sentiment and Dow Jones Industrial Average - Downtrend: 2000 – 2003

Number of observations = 422
F (6, 415) = 11402.15
Probability > F = 0.0000
R-squared = 0.9940
Adjusted R-squared = 0.9939
Root MSE= 94.078

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	1.006295	.0494693	20.34	0.000	.9090534 1.103537
Price Lag 2	.0679092	.0654294	1.04	0.300	-.060705 .1965235
Price Lag 3	-.0748296	.0457068	-1.64	0.102	-.1646754 .0150162
Sentiment Lag 1	-3.075153	6.669238	-0.46	0.645	-16.18485 10.03455
Sentiment Lag 2	-4.462229	7.272409	-0.61	0.540	-18.75758 9.833122
Sentiment Lag 3	-5.140587	6.861909	-0.75	0.454	-18.62902 8.347844

F (3, 415) =0.53
Probability > F = 0.6613

Number of observations = 422
F (6, 415) = 26.33
Probability > F = 0.0000
R-squared = 0.2757
Adjusted R-squared = 0.2652
Root MSE = .67201

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.131135	.047639	2.75	0.006	.0374912 .2247788
Sentiment Lag 2	.0422619	.0519475	0.81	0.416	-.059851 .1443749
Sentiment Lag 3	.074832	.0490152	1.53	0.128	-.0215171 .1711811
Price Lag 1	.0004201	.0003534	1.19	0.235	-.0002745 .0011147
Price Lag 2	.000114	.0004674	0.24	0.807	-.0008047 .0010327
Price Lag 3	-.0002877	.0003265	-0.88	0.379	-.0009295 .0003541

F (3, 415) =17.11
Probability > F = 0.0000

Attachment 7 Granger causality test for media sentiment and Dow Jones Industrial Average -uptrend: 2003 – 2008

Number of observations = 101
F (6, 94) = 1021.95
Probability > F = 0.0000
R-squared = 0.9849
Adjusted R-squared = 0.9839
Root MSE = 206.88

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	.8201514	.0933007	8.79	0.000	.6349008 1.005402
Price Lag 2	.0851978	.123765	0.69	0.493	-.1605404 .3309361
Price Lag 3	.0993051	.0931713	1.07	0.289	-.0856887 .2842989
Sentiment Lag 1	-18.44567	62.94462	-0.29	0.770	-143.4237 106.5324
Sentiment Lag 2	.298238	55.44308	0.01	0.996	-109.7853 110.3818
Sentiment Lag 3	-62.31548	54.48975	-1.14	0.256	-170.5061 45.87519

F (3, 94) =0.79
Probability > F = 0.5008

Number of observations = 101
F (6, 94) = 23.49
Probability > F = 0.0000
R-squared = 0.5999
Adjusted R-squared = 0.5743
Root MSE = .27705

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.4137718	.0842962	4.91	0.000	.2463997 .5811438
Sentiment Lag 2	.2155082	.07425	2.90	0.005	.068083 .3629333
Sentiment Lag 3	.1278256	.0729733	1.75	0.083	-.0170646 .2727158
Price Lag 1	.0003125	.0001249	2.50	0.014	.0000644 .0005606
Price Lag 2	-.0000198	.0001657	-0.12	0.905	-.0003489 .0003093
Price Lag 3	-.0002506	.0001248	-2.01	0.047	-.0004984 -2.86e-06

F (3, 94) =4.72
Probability > F = 0.0041

Attachment 8 Granger causality test for media sentiment and Dow Jones Industrial Average - downtrend: 2008 – 2009

Number of observations = 39
F (6, 32) = 94.35
Probability > F = 0.0000
R-squared = 0.9465
Adjusted R-squared = 0.9365
Root MSE = 129.76

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	1.099665	.1590251	6.92	0.000	.7757414 1.423588
Price Lag 2	-.4207628	.2637959	-1.60	0.121	-.9580976 .1165719
Price Lag 3	.2838013	.1958674	1.45	0.157	-.115167 .6827706
Sentiment Lag 1	94.01408	47.87873	1.96	0.058	-3.5117 191.5399
Sentiment Lag 2	-67.3556	55.57001	-1.21	0.234	-180.548 45.8368
Sentiment Lag 3	37.19942	55.51262	0.67	0.508	-75.87609 150.2749

F (3, 32) =1.66
Probability > F = 0.1958

Number of observations = 39
F (6, 32) = 0.39
Probability > F = 0.8770
R-squared = 0.0689
Adjusted R-squared = -0.1057
Root MSE = .47656

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.0043475	.1758348	0.02	0.980	-.3538162 .3625113
Sentiment Lag 2	-.1362203	.204081	-0.67	0.509	-.5519198 .2794791
Sentiment Lag 3	-.0047687	.2038703	-0.02	0.981	-.4200389 .4105014
Price Lag 1	.000704	.000584	1.21	0.237	-.0004856 .0018936
Price Lag 2	-.0010614	.0009688	-1.10	0.281	-.0030348 .0009119
Price Lag 3	.0004129	.0007193	0.57	0.570	-.0010523 .0018781

F (3, 32) =0.64
Probability > F = 0.5974

Attachment 9 Granger causality test for positive media sentiment and Dow Jones Industrial Average - downtrend: 1998

Number of observations = 39
F (6, 32) = 82.21
Probability > F = 0.0000
R-squared = 0.9391
Adjusted R-squared = 0.9277
Root MSE = 138.47

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	1.129421	.1840401	6.14	0.000	.7545433 1.504298
Price Lag 2	-.3867101	.2983513	-1.30	0.204	-.9944319 .2210117
Price Lag 3	.2139119	.2233557	0.96	0.345	-.2410487 .6688726
Sentiment Lag 1	-13.61862	69.58825	-0.20	0.846	-155.3652 128.128
Sentiment Lag 2	30.83469	46.07425	0.67	0.508	-63.01549 124.6849
Sentiment Lag 3	-2.400525	47.20175	-0.05	0.960	-98.54734 93.74629

F (3, 32) =0.16
Probability > F = 0.9245

Number of observations = 39
F (6, 32) = 2.52
Probability > F = 0.0411
R-squared = 0.3210
Adjusted R-squared = 0.1937
Root MSE = .38645

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.2556524	.1942168	1.32	0.197	-.1399542 .6512591
Sentiment Lag 2	-.0193087	.1285906	-0.15	0.882	-.2812391 .2426217
Sentiment Lag 3	.1111327	.1317373	0.84	0.405	-.1572075 .3794729
Price Lag 1	-.0000117	.0005136	-0.02	0.982	-.001058 .0010345
Price Lag 2	.0008029	.0008327	0.96	0.342	-.0008933 .002499
Price Lag 3	-.0004647	.0006234	-0.75	0.461	-.0017344 .0008051

F (3, 32) =1.78
Probability > F = 0.1707

Attachment 10 Granger causality test for negative media sentiment and Dow Jones Industrial Average - downtrend: 1998

Number of observations = 78
F (6, 71) = 545.80
Probability > F = 0.0000
R-squared= 0.9788
Adjusted R-squared = 0.9770
Root MSE = 113.33

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	.9666626	.1205932	8.02	0.000	.7262065 1.207119
Price Lag 2	.2232632	.1891912	1.18	0.242	-.1539734 .6004998
Price Lag 3	-.2148887	.1350587	-1.59	0.116	-.4841881 .0544107
Sentiment Lag 1	-16.4006	25.23496	-0.65	0.518	-66.71768 33.91648
Sentiment Lag 2	-8.623492	22.61431	-0.38	0.704	-53.71515 36.46816
Sentiment Lag 3	4.040203	25.42554	0.16	0.874	-46.65689 54.7373

F (3, 71) =0.18
Probability > F = 0.9079

Number of observations = 78
F (6, 71) = 1.29
Probability > F = 0.2723
R-squared = 0.0984
Adjusted R-squared = 0.0222
Root MSE = .43128

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	-.1095608	.0960312	-1.14	0.258	-.3010415 .0819199
Sentiment Lag 2	.0522396	.0860583	0.61	0.546	-.1193559 .2238351
Sentiment Lag 3	.1243152	.0967564	1.28	0.203	-.0686116 .3172421
Price Lag 1	.0004287	.0004589	0.93	0.353	-.0004864 .0013437
Price Lag 2	.0006795	.00072	0.94	0.348	-.0007561 .0021151
Price Lag 3	-.0010958	.000514	-2.13	0.036	-.0021207 -.000071

F (3, 71) =2.01
Probability > F = 0.1202

Attachment 11 Granger causality test for positive media sentiment and Dow Jones Industrial Average - Uptrend: 1998 – 2000

Number of observations = 78
F (6, 71) = 576.65
Probability > F = 0.0000
R-squared = 0.9799
Adjusted R-squared = 0.9782
Root MSE = 110.32

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	.9263392	.1193239	7.76	0.000	.688414 1.164264
Price Lag 2	.2333666	.1873639	1.25	0.217	-.1402265 .6069597
Price Lag 3	-.1960972	.1294268	-1.52	0.134	-.4541669 .0619724
Sentiment Lag 1	43.75524	25.38544	1.72	0.089	-6.8619 94.37238
Sentiment Lag 2	32.47331	26.05777	1.25	0.217	-19.4844 84.43103
Sentiment Lag 3	-14.10375	29.42005	-0.48	0.633	-72.76566 44.55817

F (3, 71) =1.50
Probability > F = 0.2215

Number of observations = 78
F (6, 71) = 1.15
Probability > F = 0.3417
R-squared = 0.0887
Adjusted R-squared = 0.0117
Root MSE = .46054

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	-.0166109	.1059727	-0.16	0.876	-.2279145 .1946927
Sentiment Lag 2	-.0692231	.1087794	-0.64	0.527	-.2861231 .1476768
Sentiment Lag 3	.0224734	.1228154	0.18	0.855	-.2224135 .2673603
Price Lag 1	.0004838	.0004981	0.97	0.335	-.0005094 .001477
Price Lag 2	-.0010193	.0007822	-1.30	0.197	-.0025789 .0005403
Price Lag 3	.0006979	.0005403	1.29	0.201	-.0003794 .0017752

F (3, 71) =2.18
Probability > F = 0.0979

Attachment 12 Granger causality test for negative media sentiment and Dow Jones Industrial Average - uptrend: 1998 – 2000

Number of observations = 377
F (6, 370) = 3786.21
Probability > F = 0.0000
R-squared = 0.9840
Adjusted R-squared = 0.9837
Root MSE = 127.57

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	1.048722	.0528351	19.85	0.000	.9448274 1.152617
Price Lag 2	-.0395013	.0716846	-0.55	0.582	-.1804617 .1014591
Price Lag 3	-.0178411	.0526846	-0.34	0.735	-.12144 .0857577
Sentiment Lag 1	-12.5486	15.6288	-0.80	0.423	-43.27102 18.18382
Sentiment Lag 2	4.556919	16.34961	0.28	0.781	-27.59289 36.70673
Sentiment Lag 3	.1182445	16.10068	0.01	0.994	-31.54207 31.77856

F (3, 370) =0.24
Probability > F = 0.8691

Number of observations = 377
F (6, 370) = 2.28
Probability > F = 0.0358
R-squared = 0.0356
Adjusted R-squared = 0.0200
Root MSE = .37778

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.0115222	.0462805	0.25	0.804	-.0794835 .102528
Sentiment Lag 2	.0438579	.048415	0.91	0.366	-.0513451 .1390609
Sentiment Lag 3	.028925	.0476778	0.61	0.544	-.0648284 .1226785
Price Lag 1	.000134	.0001565	0.86	0.392	-.0001736 .0004417
Price Lag 2	.0001687	.0002123	0.79	0.427	-.0002488 0005861
Price Lag 3	-.000241	.000156	-1.54	0.123	-.0005477 .0000658

F (3,370) =4.25
Probability > F = 0.0057

Attachment 13 Granger causality test for positive media sentiment and Dow Jones Industrial Average - downtrend: 2000 – 2003

Number of observations = 377
F (6, 370) = 3793.04
Probability > F = 0.0000
R-squared = 0.9840
Adjusted R-squared = 0.9837
Root MSE = 127.46

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	1.038897	.0535492	19.40	0.000	.9335978 1.144196
Price Lag 2	-.0374757	.0715065	-0.52	0.601	-.1780858 .1031343
Price Lag 3	-.014545	.0523979	-0.28	0.781	-.1175801 .0884901
Sentiment Lag 1	16.58009	17.62446	0.94	0.347	-18.07658 51.23676
Sentiment Lag 2	6.513052	16.24955	0.40	0.689	-25.44 38.46611
Sentiment Lag 3	-6.981044	16.44475	-0.42	0.671	-39.31793 25.35584

F (3, 370) =0.46
Probability > F = 0.7114

Number of observations = 377
F (6, 370) = 62.48
Probability > F = 0.0000
R-squared = 0.5033
Adjusted R-squared = 0.4952
Root MSE = .32002

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.2424636	.0442497	5.48	0.000	.1554511 .329476
Sentiment Lag 2	.1788159	.0407977	4.38	0.000	.0985914 .2590404
Sentiment Lag 3	.1497386	.0412878	3.63	0.000	.0685504 .2309268
Price Lag 1	.0003635	.0001344	2.70	0.007	.0000992 .0006279
Price Lag 2	.0001483	.0001795	0.83	0.409	-.0002048 .0005013
Price Lag 3	-.000422	.0001316	-3.21	0.001	-.0006807 -.0001633

F (3, 370) =10.53
Probability > F = 0.0000

Attachment 14 Granger causality test for negative media sentiment and Dow Jones Industrial Average - downtrend: 2000 – 2003

Number of observations = 422
F (6, 415) = 11443.73
Probability > F = 0.0000
R-squared = 0.9940
Adjusted R-squared = 0.9939
Root MSE = 93.908

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	1.009988	.0494691	20.42	0.000	.9127472 1.10723
Price Lag 2	.0706912	.0652868	1.08	0.280	-.0576427 .1990252
Price Lag 3	-.07849	.0454842	-1.73	0.085	-.1678981 .010918
Sentiment Lag 1	.9630887	6.551613	0.15	0.883	-11.9154 13.84157
Sentiment Lag 2	-9.147017	6.747403	-1.36	0.176	-22.41037 4.116332
Sentiment Lag 3	-4.068937	6.360075	-0.64	0.523	-16.57092 8.433043

F (3, 415) =1.03
Probability > F = 0.03772

Number of observations = 422
F (6, 415) = 86.08
Probability > F = 0.0000
R-squared = 0.5545
Adjusted R-squared = 0.5480
Root MSE = .69336

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.1553304	.0483727	3.21	0.001	.0602444 .2504165
Sentiment Lag 2	.1974992	0.498183	3.96	0.000	.0995716 .2954268
Sentiment Lag 3	.1763422	.0469585	3.76	0.000	.084036 .2686484
Price Lag 1	.000928	.0003652	2.54	0.011	.00021 .0016459
Price Lag 2	-.0007133	.000482	-1.48	0.140	-.0016609 .0002342
Price Lag 3	.0000777	.0003358	0.23	0.817	-.0005824 .0007378

F (3, 415) =16.32
Probability > F = 0.0000

Attachment 15 Granger causality test for positive media sentiment and Dow Jones Industrial Average - Uptrend: 2003 – 2008

Number of observations = 422
F (6, 415) = 11405.64
Probability > F = 0.0000
R-squared = 0.9940
Adjusted R-squared = 0.9939
Root MSE = 94.064

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	1.007776	.0496201	20.31	0.000	.9102376 1.105314
Price Lag 2	.0635956	.0654257	0.97	0.332	-.0650115 .1922027
Price Lag 3	-.0736699	.0455138	-1.62	0.106	-.1631363 .0157964
Sentiment Lag 1	-3.966885	8.895296	-0.45	0.656	-21.45234 13.51857
Sentiment Lag 2	11.25069	9.183221	1.23	0.221	-6.800741 29.30211
Sentiment Lag 3	1.014525	8.463334	0.12	0.905	-15.62182 17.65087

F (3, 415) =0.57
Probability > F = 0.6329

Number of observations = 422
F (6, 415) = 32.25
Probability > F = 0.0000
R-squared = 0.3180
Adjusted R-squared = 0.3082
Root MSE = .51397

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.1518444	.0486045	3.12	0.002	.0563027 .2473862
Sentiment Lag 2	.1122399	.0501778	2.24	0.026	.0136057 .2108742
Sentiment Lag 3	.1229946	.0462442	2.66	0.008	.0320924 .2138968
Price Lag 1	-.000577	.0002711	-2.13	0.034	-.00111 -.0000441
Price Lag 2	.0007347	.0003575	2.06	0.040	.000032 .0014374
Price Lag 3	-.0003235	.0002487	-1.30	0.194	-.0008123 .0001654

F (3, 415) =14.25
Probability > F = 0.0000

Attachment 16 Granger causality test for negative media sentiment and Dow Jones Industrial Average - uptrend: 2003 – 2008

Number of observations = 101
F (6, 94) = 1041.71
Probability > F = 0.0000
R-squared = 0.9852
Adjusted R-squared = 0.9842
Root MSE = 204.94

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	.8169513	.0931741	8.77	0.000	.631952 1.001951
Price Lag 2	.0896168	.1222972	0.73	0.466	-.1532071 .3324407
Price Lag 3	.1054287	.0943361	1.12	0.267	-.0818778 .2927352
Sentiment Lag 1	-103.7037	68.13577	-1.52	0.131	-238.9889 31.58143
Sentiment Lag 2	84.23686	57.18484	1.47	0.144	-29.30499 197.7787
Sentiment Lag 3	-28.77594	54.50601	-0.53	0.599	-136.9989 79.44703

F (3, 94) =1.40
Probability > F = 0.2464

Number of observations = 101
F (6, 94) = 110.80
Probability > F = 0.0000
R-squared = 0.8761
Adjusted R-squared = 0.8682
Root MSE = .24776

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.5023688	.0823754	6.10	0.000	.3388106 .665927
Sentiment Lag 2	.2074517	.0691358	3.00	0.003	.0701809 .3447225
Sentiment Lag 3	.2160551	.0658971	3.28	0.001	.0852148 .3468955
Price Lag 1	.0001058	.0001126	0.94	0.350	-.0001178 .0003295
Price Lag 2	.0000421	.0001479	0.28	0.777	-.0002515 .0003356
Price Lag 3	-.0001088	.0001141	-0.95	0.342	-.0003353 .0001176

F (3, 94) =1.90
Probability > F = 0.1350

Attachment 17 Granger causality test for positive media sentiment and Dow Jones Industrial Average - downtrend: 2008 – 2009

Number of observations = 101
F (6, 94) = 1050.25
Probability > F = 0.0000
R-squared = 0.9853
Adjusted R-squared = 0.9844
Root MSE = 204.11

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	.8345524	.0939253	8.89	0.000	.6480615 1.021043
Price Lag 2	.0674057	.1228089	0.55	0.584	-.1764341 .3112456
Price Lag 3	.0930291	.0937129	0.99	0.323	-.0930401 .2790983
Sentiment Lag 1	166.3252	85.52655	1.94	0.055	-3.489758 336.1402
Sentiment Lag 2	-147.2487	79.21074	-1.86	0.066	-304.5235 10.02609
Sentiment Lag 3	-19.4044	78.83142	-0.25	0.806	-175.926 137.1172

F (3, 94) =1.67
Probability > F = 0.1790

Number of observations = 101
F (6, 94) = 51.44
Probability > F= 0.0000
R-squared = 0.7665
Adjusted R-squared = 0.7516
Root MSE = .24795

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.501396	.1038931	4.83	0.000	.2951138 .7076783
Sentiment Lag 2	.1390885	.096221	1.45	0.152	-.0519606 .3301377
Sentiment Lag 3	.2265989	.0957603	2.37	0.020	.0364647 .4167332
Price Lag 1	.0002363	.0001141	2.07	0.041	9.80e-06 .0004629
Price Lag 2	-.0000771	.0001492	-0.52	0.606	-.0003733 .0002191
Price Lag 3	-.0001833	.0001138	-1.61	0.111	-.0004094 .0000427

F (3, 94) =2.30
Probability > F = 0.0827

Attachment 18 Granger causality test for negative media sentiment and Dow Jones Industrial Average - downtrend: 2008 – 2009

Number of observations = 25631
F (6, 25624) = -
Probability > F = 0.0000
R-squared = 0.9999
Adjusted R-squared = 0.9999
Root MSE = .00027

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	.976496	.0062401	156.49	0.000	.9642649 .988727
Price Lag 2	.0365072	.0087175	4.19	0.000	.0194204 .053594
Price Lag 3	-.0130444	.0062331	-2.09	0.036	-.0252617 -.0008272
Sentiment Lag 1	-.0000344	.000018	-1.91	0.057	-.0000697 9.83e-07
Sentiment Lag 2	.0000372	.0000254	1.46	0.143	-.0000126 .000087
Sentiment Lag 3	-9.35e-07	.0000181	-0.05	0.959	-.0000363 .0000345

F (3, 25624) =1.56
Probability > F = 0.1975

Number of observations = 25828
F (6, 25821) = -
Probability > F = 0.0000
R-squared = 0.9868
Adjusted R-squared = 0.9868
Root MSE = .09378

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.9913947	.006219	159.41	0.000	.9792051 1.003584
Sentiment Lag 2	.0017261	.0087603	0.20	0.844	-.0154447 .0188969
Sentiment Lag 3	-.0004097	.0062232	-0.07	0.948	-.0126075 .0117881
Price Lag 1	3.889101	2.154689	1.80	0.071	-.3342102 8.112411
Price Lag 2	-6.42803	3.00844	-2.14	0.033	-12.32474 -.5313207
Price Lag 3	2.591613	2.15017	1.21	0.228	-1.622841 6.806066

F (3, 25821) =3.55
Probability > F = 0.0137

Attachment 19 Granger causality test for cumulative media sentiment (Reuters/Bloomberg) and EURUSD exchange price

Number of observations = 25644
F (6, 25637) = -
Probability > F = 0.0000
R-squared = 0.9999
Adjusted R-squared = 0.9999
Root MSE = .00027

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	.9765552	.0062382	156.54	0.000	.964328 .9887825
Price Lag 2	.0364176	.008715	4.18	0.000	.0193357 .0534995
Price Lag 3	-.013023	.0062316	-2.09	0.037	-.0252374 -.0008087
Sentiment Lag 1	-.0000148	9.23e-06	-1.61	0.108	-.0000329 3.26e-06
Sentiment Lag 2	.0000145	.000013	1.11	0.265	-.000011 .00004
Sentiment Lag 3	2.26e-06	9.20e-06	0.25	0.806	-.0000158 .0000203

F (3, 25637) =1.67
Probability > F = 0.1718

Number of observations = 25843
F (6, 25836) = -
Probability > F = 0.000
R-squared = 0.9810
Adjusted R-squared = 0.9810
Root MSE = .18265

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.9947902	.0062102	160.19	0.000	.9826179 1.006962
Sentiment Lag 2	-.0000133	.0087434	-0.00	0.999	-.0171509 .0171242
Sentiment Lag 3	-.0051059	.0061868	-0.83	0.409	-.0172324 .0070206
Price Lag 1	4.021553	4.195883	0.96	0.338	-4.202611 12.24572
Price Lag 2	-8.423474	5.858214	-1.44	0.150	-19.9059 3.058953
Price Lag 3	4.519777	4.186914	1.08	0.280	-3.686808 12.72636

F (3, 25836) =3.27
Probability > F = 0.0204

Attachment 20 Granger causality test for Reuters news sentiment and EURUSD exchange rate

Number of observations = 23914
F (6, 23907) = -
Probability > F = 0.0000
R-squared = 0.9999
Adjusted R-squared = 0.9999
Root MSE = .00027

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	.9754963	.0064603	151.00	0.000	.9628347 .9881599
Price Lag 2	.0383663	.0090209	4.25	0.000	.0206847 .0560479
Price Lag 3	-.0138966	.0064564	-2.15	0.031	-.0265516 -.0012416
Sentiment Lag 1	5.84e-06	.0000177	0.33	0.741	-.0000288 .0000405
Sentiment Lag 2	-.0000527	.0000249	-2.12	0.034	-.0001014 -3.94e-06
Sentiment Lag 3	.0000494	.0000177	2.79	0.005	.0000147 .000084

F (3, 23907) =3.02
Probability > F = 0.0287

Number of observations = 24113
F (6, 24106) = -
Probability > F = 0.0000
R-squared = 0.9868
Adjusted R-squared = 0.9868
Root MSE = .10004

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.9887129	.0064463	153.38	0.000	.9760776 1.001348
Sentiment Lag 2	.0088564	.0090701	0.98	0.329	-.0089216 .0266343
Sentiment Lag 3	-.004186	.0064567	-0.65	0.517	-.0168415 .0084694
Price Lag 1	.0307258	2.35868	0.01	0.990	-4.592434 4.653886
Price Lag 2	-3.336916	3.291303	-1.01	0.311	-9.788076 3.114244
Price Lag 3	3.288859	2.35452	1.40	0.162	-1.326148 7.903865

F (3, 24106) =0.83
Probability > F = 0.4752

Attachment 21 Granger causality test for Bloomberg news database and EURUSD exchange price

Number of observations = 330
F (6, 323) = 3015.83
Probability > F = 0.0000
R-squared = 0.9825
Adjusted R-squared = 0.9821
Root MSE = .00823

Closing Price	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Price Lag 1	1.035979	.0548266	18.90	0.000	.9281168 1.143841
Price Lag 2	.0171854	.0784809	0.22	0.827	-.1372128 .1715835
Price Lag 3	-.0675196	.0548249	-1.23	0.219	-.1753785 .0403393
Sentiment Lag 1	.0017134	.0007245	2.37	0.019	.0002881 .0031387
Sentiment Lag 2	.0017128	.0007349	2.33	0.020	.0002669 .0031586
Sentiment Lag 3	-.0019428	.0007307	-2.66	0.008	-.0033804 -.0005053

F (3, 323) =6.09
Probability > F = 0.0005

Number of observations = 330
F (6, 323) = 3.63
Probability > F = 0.0017
R-squared = 0.0632
Adjusted R-squared = 0.0458
Root MSE = .62929

Sentiment	Coefficient	Std. Error.	t	P>t	**95% confidence interval**
Sentiment Lag 1	.1412008	.0553623	2.55	0.011	.0322844 .2501171
Sentiment Lag 2	-.0209889	.056163	-0.37	0.709	-.1314803 .0895024
Sentiment Lag 3	.1866006	.0558395	3.34	0.001	.0767455 .2964557
Price Lag 1	-7.49778	4.189727	-1.79	0.074	-15.74038 .7448181
Price Lag 2	2.843861	5.997332	0.47	0.636	-8.954902 14.64263
Price Lag 3	4.82934	4.189593	1.15	0.250	-3.412996 13.07168

F (3, 323) =1.64
Probability > F = 0.1802

Attachment 22 Granger causality test for Reuters news database and EURUSD exchange price

Attachment 23: List of News Sources Used for Database I

Sources	Type of Publication
Access Control & Security Systems Integration	Industry Specific
Advertising Age	Industry Specific
Advertising Age Creativity	Industry Specific
ADWEEK	Industry Specific
AfricaFocus Bulletin	General
Africa News	News
African Mining Monitor	Industry Specific
Aircraft Value News	News
AirFinance Journal	Industry Specific
Airline Business	Industry Specific
Airline Business Report	Industry Specific
Airline Industry Information	Industry Specific
Airport Security Report	Industry Specific
Air Safety Week	Industry Specific
Air Traffic Management	Industry Specific
Al-Jazeera	News
AllAfrica.com	General
AllAfrica Web Publications (English)	General
American City & County	General
American Demographics	Industry Specific
American Machinist (Penton)	Industry Specific
American Printer	Industry Specific
American School & University	Education
Angola Press Agency	News
Apply	Industry Specific
AR (Absolute Return + Alpha)	Financial
Arable Farming	Industry Specific
AsiaLaw	Industry Specific
Asiamoney	Financial
Associations Meetings	Industry Specific

Australian Financial Review	Financial
Automotive News	Industry Specific
Automotive News Europe	Industry Specific
Automotive News German Auto Industry Newsletter	Industry Specific
AutoWeek	Industry Specific
Aviation Maintenance	Industry Specific
Aviation Week & Space Technology	Industry Specific
Avionics	Industry Specific
Baking Management	Industry Specific
Baltic News Service	News
Bank Systems & Technology	Industry Specific
BBC Monitoring	News intelligence
BEEF	Industry Specific
Belfast News Letter	General
Belfast Telegraph	General
BI Industry Focus	Industry Specific
Billboard	Industry Specific
BIOMECHANICS	Industry Specific
Birmingham Evening Mail	General
Birmingham Post	General
Brand Strategy	Industry Specific
Brisbane News	General
Broadcast Engineering	Industry Specific
Broadcast News	Industry Specific
BRW Abstracts (Australia)	Industry Specific
BtoB	Industry Specific
Builder	Industry Specific
Building Design	Industry Specific
Bulk Transporter	Industry Specific
Business & Finance Magazine	News
Business Day (South Africa)	Financial
Business Finance (Penton)	Financial

Business Insurance	Industry Specific
Business Performance Management	Industry Specific
BusinessWorld	Financial
C4I News	News
Cabinet Maker	Industry Specific
CableFax	New
CableFAX's CableWORLD	News
Cable World	News
Call Center Magazine	Industry Specific
Carpet & Floorcoverings Review	Industry Specific
Caterer & Hotelkeeper	Industry Specific
Centaur Communications Ltd.	Industry Specific
Central Office Of Information (Hermes Database)	News
CFO	Industry Specific
Chemical Week	Industry Specific
Chemist & Druggist	Industry Specific
China Law & Practice	Industry Specific
Club Industry	Industry Specific
Commercial Motor	Industry Specific
Communications Technology	Industry Specific
Communications Today	Industry Specific
Community Care	Industry Specific
Commuter/Regional Airline News	Industry Specific
CommWeb	Industry Specific
Compliance Reporter	Industry Specific
Computer Reseller News	Industry Specific
Computer Weekly	Industry Specific
Connected Planet	Industry Specific
Corporate Financing Week	Industry Specific
Corporate IT Update	Industry Specific
Corporate Meetings & Incentives	Industry Specific
Corporate Money	Industry Specific

Countryman	Industry Specific
Crain's Chicago Business	Industry Specific
Crain's Cleveland Business	Industry Specific
Crain's Detroit Business	Industry Specific
Crain's New York Business	Industry Specific
Creative Review	General
Credit Investment News	Financial
CRNtech	Industry Specific
CT's Pipeline	Industry Specific
CT's Voice Report	Industry Specific
CT Reports	Industry Specific
Daily News (New York)	General
Daily Post (Liverpool)	General
Daily Record & Sunday Mail	General
Daily Star	General
Daily Telegraph and Sunday Telegraph (Sydney, Australia)	General
Daily Variety	General
Dairy Farmer	Industry Specific
DCD Business Report	Financial
Defense Daily	Industry Specific
Defense Daily International	Industry Specific
Defined Contributions & Savings Plan Alert	Industry Specific
Delta Farm Press	Industry Specific
Derivatives Week	Financial
Design Week	Industry Specific
Deutsche Presse-Agentur - Englisch	news
Diagnostic Imaging	Industry Specific
Digital Connect Magazine	Industry Specific
Direct Magazine	Industry Specific
Doctor	Industry Specific
Egi Web News	News
EHS Today	General

EI Finance	Financial
Electrical Construction & Maintenance	Industry Specific
Electrical Wholesaling	Industry Specific
Electronic Chemicals News	Industry Specific
Electronic Engineering Times	Industry Specific
Electronic Gaming Business	Industry Specific
Electronics Weekly	Industry Specific
Embedded Systems Design	Industry Specific
Employers Law	Industry Specific
Energy Compass	Industry Specific
Energy Intelligence Briefing	Industry Specific
Energy Network	Industry Specific
Entertainment Design	Industry Specific
Estates Gazette	Industry Specific
Euromoney	Financial
European Rubber Journal	Industry Specific
EuropeMedia	General
Europolitics (daily in English)	Politics
EuroProperty Magazine	Industry Specific
EuroWeek	General
Evening Times (Glasgow)	General
EXE	Industry Specific
Expansion Management	Industry Specific
Farmers Guardian	Industry Specific
Farm Industry News	Industry Specific
Fiber Optics Forecast	Industry Specific
Financial & Insurance Meetings	Industry Specific
Financial Mail (South Africa)	Financial
Fire Chief	Industry Specific
Fleet Owner	Industry Specific
Flight International	Industry Specific
Food Management (Penton)	Industry Specific

Forestry & British Timber	Industry Specific
Foundation & Endowment Money Management	Industry Specific
FO Week	Industry Specific
FOW Magazine	Industry Specific
FT Expat	Industry Specific
Fund Action	Industry Specific
Game Developer	Industry Specific
Garowe Online (Garowe)	Industry Specific
Glass Age	Industry Specific
Global Investor	Financial
Global Money Management	Financial
Global Telecoms Business	Industry Specific
Government Procurement Report	Industry Specific
Government Security	Industry Specific
Grounds Maintenance	Industry Specific
Hay & Forage Grower	Industry Specific
Haymarket	Industry Specific
HD/Studio	Industry Specific
Health-e (Cape Town)	Industry Specific
Helicopter News	Industry Specific
Herald Sun/Sunday Herald Sun (Melbourne, Australia)	General
Het Financieele Dagblad (English)	Industry Specific
HomeCare Magazine	Industry Specific
Hospital Doctor	Industry Specific
Hydraulics & Pneumatics (Penton)	Industry Specific
Hydrocarbon Processing	Industry Specific
ICIS Chemical Business	Industry Specific
ICIS Chemical Business America	Industry Specific
Independent.co.uk	General
INEWS;IACCIN	News
INEWS;IC4INE	News
Information Bank Abstracts	Industry Specific

InformationWeek	General
Inside Digital TV	Industry Specific
Institutional Investor (America's Edition)	Industry Specific
Institutional Investor (International Edition)	Industry Specific
Insurance & Technology	Industry Specific
Intelligent Enterprise	Industry Specific
International Financial Adviser	Industry Specific
International Herald Tribune	General
International Money Marketing	Industry Specific
International Oil Daily	Financial
International Securities Finance	Financial
Internet Business News	Industry Specific
Inter Press Service (Johannesburg)	News
Investment News	Financial
Investment Week	Financial
IT Architect	Industry Specific
ITAR-TASS	News
IT Contracts	News
Jet Fuel Intelligence	Industry Specific
Kiplinger Publications	Industry Specific
Kirkus Reviews	Industry Specific
Korea Herald	General
Korea Times	General
LatinFinance	Financial
Lawyers Weekly	Industry Specific
Legal Week	Industry Specific
Liquid Real Estate	Industry Specific
Live Design	Industry Specific
Liverpool Echo	General
Lodging Hospitality (Penton)	Industry Specific
Los Angeles Times	General
Machine Design (Penton)	Industry Specific

Maghreb Confidential	Industry Specific
Managed Services Insider	Industry Specific
Marketing Week	Industry Specific
Media Business	Industry Specific
Media Industry Newsletter	Industry Specific
Medical Design (Penton)	Industry Specific
Medical Meetings	Industry Specific
Mergers and Acquisitions, The Dealmaker's Journal	Industry Specific
Mermigas on Media	Industry Specific
Metal Bulletin Daily Alerts	Industry Specific
Metal Bulletin Monthly	Industry Specific
Metal Bulletin Weekly	Industry Specific
Microscope	Industry Specific
Middle East Newsfile (Moneyclips)	Financial
Middlesbrough Evening Gazette	General
Midland Independent Newspapers	General
Millimeter	Industry Specific
Min's Advertising Report	Industry Specific
MIN's B2B	Industry Specific
Mining Magazine	Industry Specific
Mobile Matters	Industry Specific
Modern Baking	Industry Specific
Modern Healthcare	Industry Specific
Modern Physician	Industry Specific
Money Management Letter	Industry Specific
Money Marketing	Industry Specific
Moscow News	News
Motion System Design	Industry Specific
Motor Transport	Industry Specific
MTI Econews	Industry Specific
Multichannel Merchant	Industry Specific
Music Education Technology	Industry Specific

Music Week	Industry Specific
National Hog Farmer	Industry Specific
National Post's Financial Post & FP Investing	Financial
National Post	General
National Real Estate Investor	Industry Specific
Natural Gas Week	Industry Specific
Nefte Compass	Industry Specific
Network Computing	Industry Specific
New Media Age	Industry Specific
New Musical Express	Industry Specific
New Scientist	Industry Specific
Newsday	News
New Straits Times (Malaysia)	General
Newsweek	General
Nordic Business Report	Financial
Northern Territory News (Australia)	News
NZ Infotech Weekly (Wellington)	Industry Specific
Occupational Health	Industry Specific
Off Licence News	Industry Specific
Oil & Gas Journal	Industry Specific
Oil Daily	Industry Specific
Oil Market Intelligence	News Intelligence
Onstage	Industry Specific
Operations & Fulfillment	Industry Specific
Operations Management	Industry Specific
Optimize	Industry Specific
Ottawa Citizen	General
Packaging Magazine	Industry Specific
Paper, Film & Foil Converter	Industry Specific
Pasha Publications	Industry Specific
Pensions Age	Industry Specific
Pensions and Investments	Industry Specific

Personnel Today	Industry Specific
Petroleum Economist	Industry Specific
Petroleum Intelligence Weekly	Industry Specific
Pharmacy Today	Industry Specific
Pharma Marketletter	Industry Specific
Plastics News	Industry Specific
Platts Energy Business & Technology	Industry Specific
Platts Retail Energy	Industry Specific
PlusNews (Johannesburg)	News
Polish News Bulletin	News
Power, Finance and Risk	Industry Specific
Power Electronics Technology	Industry Specific
Precision Marketing	Industry Specific
Print and Media Buyer	Industry Specific
Printing World	Industry Specific
PR News	Industry Specific
Professional Adviser	Industry Specific
Profitable Embroiderer	Industry Specific
Project Finance	Industry Specific
Promo	Industry Specific
Psychiatric Times	Industry Specific
Public Agenda (Accra)	Industry Specific
Pulse	Industry Specific
RCR Wireless News	Industry Specific
Reactions	Industry Specific
Real Estate Finance and Investment	Industry Specific
Refrigerated Transporter	Industry Specific
Registered Rep	Industry Specific
Religious Conference Manager	Industry Specific
Rental Equipment Register	Industry Specific
Restaurant Hospitality (Penton)	Industry Specific
Retail Traffic	Industry Specific

Retail Week	Industry Specific
Rotor & Wing	Industry Specific
Rubber & Plastics News	Industry Specific
Satellite News	Industry Specific
Satellite Today	Industry Specific
SC Magazine (US)	Industry Specific
Securities Data Publications	Industry Specific
Shabait.com (Asmara)	General
Shabelle Media Network (Mogadishu)	General
South China Morning Post	General
Southeast Farm Press	Industry Specific
South Wales Echo	General
Southwest Farm Press	Industry Specific
Space & Missile Defense Report	Industry Specific
Special Events	Industry Specific
Sports Argus	Industry Specific
SQL Server	Industry Specific
Staging Rental Operations	Industry Specific
Sunday Herald	General
Sunday Mercury	General
Sunday Times (South Africa)	General
Supermarket News	Industry Specific
SW Radio Africa (London)	Industry Specific
Tampa Bay Times	Industry Specific
TechNews	Industry Specific
TechWeb	Industry Specific
Telecomworldwire	Industry Specific
telegraph.co.uk	General
Television Broadcast	Industry Specific
Television Week	Industry Specific
Terror Response Technology Report	Industry Specific
The Advertiser/Sunday Mail (Adelaide, South Australia)	Industry Specific

The Age (Melbourne, Australia)	General
The Australian	General
The Banker	Industry Specific
The Business	Financial
The Business Times Singapore	Financial
The Canberra Times	General
The Christian Science Monitor	General
The Corn & Soybean Digest	General
The Courier Mail/The Sunday Mail (Australia)	General
The Daily Mail and Mail on Sunday (London)	General
The Daily Telegraph (London)	General
The Daily Yomiuri (Tokyo)	General
The Deal Pipeline	Industry Specific
The Dominion (Wellington)	General
The Dominion Post (Wellington, New Zealand)	General
The Edge Malaysia	General
The Edge Singapore	General
The Electricity Journal	Industry Specific
The Evening Post (Wellington)	General
The Evening Standard (London)	General
The Express	General
The Gazette	General
The Globe and Mail (Canada)	General
The Grocer	Industry Specific
The Guardian (London)	General
The Herald (Glasgow)	General
The Independent (London)	General
The Investors Chronicle	Financial
The Irish Times	General
The Japan Times	General
The Jerusalem Post	General
The Jerusalem Report	General

The Kalgoorlie Miner	Industry Specific
The Lawyer	Industry Specific
The Mercury/Sunday Tasmanian (Australia)	General
The Mirror (The Daily Mirror and The Sunday Mirror)	General
The Moscow News (RIA Novosti)	News
The Moscow Times	General
The Nation (Thailand)	General
The New Yorker	General
The New York Times	General
The New York Times abstracts of articles published by The Sunday Times of London	General
The New York Times abstracts of articles published by The Times of London	General
The New York Times - Biographical Materials	Industry Specific
The New York Times - Government Biographical Materials	General
The New Zealand Herald	General
The Nikkei Weekly (Japan)	Financial
The Northern Echo	General
The Observer	General
The People	General
The Philadelphia Inquirer	General
The Practitioner	General
The Prague Post	General
The Press (Christchurch, New Zealand)	General
The Progressive Grocer	Industry Specific
The Scotsman & Scotland on Sunday	General
The Straits Times (Singapore)	General
The Sunday Express	General
The Sunday Telegraph (London)	General
The Sydney Morning Herald (Australia)	General
The Toronto Star	General
The Washington Post	General

The Washington Post Biographical Stories	General
The Washington Times	General
The Weekender (South Africa)	General
The Weekly Times	General
The West Australian	General
The Western Mail	General
Tire Business	Financial
Total Alternatives	Industry Specific
Total Securitization	Industry Specific
Trade Finance	Financial
Trailer/Body Builders	Industry Specific
Training Magazine	Industry Specific
Transmission & Distribution World	Industry Specific
Travel Trade Gazette UK & Ireland	Industry Specific
Travel Weekly	Industry Specific
Tunisia Online (Tunis)	General
UN Integrated Regional Information Networks (Nairobi)	News
United Business Media LLC	Industry Specific
United Nations-African Union Mission in Darfur (El Fasher)	Industry Specific
UN News Service (New York)	news
Urgent Communications	Industry Specific
USA Today	General
Utility Week	Industry Specific
VARBusiness	Financial
Variety	Industry Specific
Very Light Jet Report	Industry Specific
Via Satellite	Industry Specific
Video Systems	Industry Specific
Wales on Sunday	General
Wall Street & Technology	Industry Specific
Wall Street Journal Abstracts	General
Ward's Dealer Business	Industry Specific

Wards Auto World	Industry Specific
Warren Publications	Industry Specific
Waste Age	Industry Specific
Waste News	Industry Specific
Welding Design & Fabrication	Industry Specific
Western Farm Press	Industry Specific
What's new in Building	Industry Specific
Wilmington Publications	Industry Specific
Windows IT Pro Magazine	Industry Specific
Wireless Review	Industry Specific
Workforce Management	Industry Specific
World Gas Intelligence	Industry Specific
World Oil	Industry Specific
WorldSources - Emerging Markets	Industry Specific
Worldwide Computer Product News	Industry Specific
Xtreme Information	Industry Specific

1	**Accident & Health Insurance**
2	Advertising Agencies
3	Aerospace/Defense - Major Diversified
4	Aerospace/Defense Products & Services
5	Agricultural Chemicals
6	Air Delivery & Freight Services
7	Air Services, Other
8	Aluminum
9	Apparel Stores
10	Appliances
11	Application Software
12	Asset Management
13	Auto Dealerships
14	Auto Manufacturers - Major
15	Auto Parts
16	Auto Parts Stores
17	Auto Parts Wholesale
18	Basic Materials Wholesale
19	Beverages - Brewers
20	Beverages - Soft Drinks
21	Beverages - Wineries & Distillers
22	Biotechnology
23	Broadcasting - Radio
24	Broadcasting - TV
25	Building Materials Wholesale
26	Business Equipment
27	Business Services

28	Business Software & Services
29	CATV Systems
30	Catalog & Mail Order Houses
31	Cement
32	Chemicals - Major Diversified
33	Cigarettes
34	Cleaning Products
35	Closed-End Fund - Debt
36	Closed-End Fund - Equity
37	Closed-End Fund - Foreign
38	Communication Equipment
39	Computer Based Systems
40	Computer Peripherals
41	Computers Wholesale
42	Confectioners
43	Conglomerates
44	Consumer Services
45	Copper
46	Credit Services
47	Dairy Products
48	Data Storage Devices
49	Department Stores
50	Diagnostic Substances
51	Discount, Variety Stores
52	Diversified Communication Services
53	Diversified Computer Systems
54	Diversified Electronics

55	Diversified Investments
56	Diversified Machinery
57	Diversified Utilities
58	Drug Delivery
59	Drug Manufacturers - Major
60	Drug Manufacturers - Other
61	Drug Related Products
62	Drug Stores
63	Drugs - Generic
64	Drugs Wholesale
65	Education & Training Services
66	Electric Utilities
67	Electronic Equipment
68	Electronics Stores
69	Electronics Wholesale
70	Entertainment - Diversified
71	Farm & Construction Machinery
72	Farm Products
73	Food - Major Diversified
74	Food Wholesale
75	Foreign Money Center Banks
76	Foreign Regional Banks
77	Foreign Utilities
78	Gaming Activities
79	Gas Utilities
80	General Building Materials
81	General Contractors

82	General Entertainment
83	Gold
84	Grocery Stores
85	Health Care Plans
86	Healthcare Information Services
87	Heavy Construction
88	Home Furnishing Stores
89	Home Furnishings & Fixtures
90	Home Health Care
91	Home Improvement Stores
92	Hospitals
93	Housewares & Accessories
94	Independent Oil & Gas
95	Industrial Electrical Equipment
96	Industrial Equipment & Components
97	Industrial Equipment Wholesale
98	Industrial Metals & Minerals
99	Information & Delivery Services
100	Information Technology Services
101	Insurance Brokers
102	Internet Information Providers
103	Internet Service Providers
104	Internet Software & Services
105	Investment Brokerage - National
106	Investment Brokerage - Regional
107	Jewelry Stores
108	Life Insurance

109	Lodging
110	Long Distance Carriers
111	Long-Term Care Facilities
112	Lumber, Wood Production
113	Machine Tools & Accessories
114	Major Airlines
115	Major Integrated Oil & Gas
116	Management Services
117	Manufactured Housing
118	Marketing Services
119	Meat Products
120	Medical Appliances & Equipment
121	Medical Equipment Wholesale
122	Medical Instruments & Supplies
123	Medical Laboratories & Research
124	Medical Practitioners
125	Metal Fabrication
126	Money Center Banks
127	Mortgage Investment
128	Movie Production, Theaters
129	Multimedia & Graphics Software
130	Music & Video Stores
131	Networking & Communication Devices
132	Nonmetallic Mineral Mining
133	Office Supplies
134	Oil & Gas Drilling & Exploration
135	Oil & Gas Equipment & Services

136	Oil & Gas Pipelines
137	Oil & Gas Refining & Marketing
138	Packaging & Containers
139	Paper & Paper Products
140	Personal Computers
141	Personal Products
142	Personal Services
143	Photographic Equipment & Supplies
144	Pollution & Treatment Controls
145	Printed Circuit Boards
146	Processed & Packaged Goods
147	Processing Systems & Products
148	Property & Casualty Insurance
149	Property Management
150	Publishing - Books
151	Publishing - Newspapers
152	Publishing - Periodicals
153	REIT - Diversified
154	REIT - Healthcare Facilities
155	REIT - Hotel/Motel
156	REIT - Industrial
157	REIT - Office
158	REIT - Residential
159	REIT - Retail
160	Railroads
161	Real Estate Development
162	Recreational Goods, Other

163	Recreational Vehicles
164	Regional - Mid-Atlantic Banks
165	Regional - Midwest Banks
166	Regional - Northeast Banks
167	Regional - Pacific Banks
168	Regional - Southeast Banks
169	Regional - Southwest Banks
170	Regional Airlines
171	Rental & Leasing Services
172	Research Services
173	Residential Construction
174	Resorts & Casinos
175	Restaurants
176	Rubber & Plastics
177	Savings & Loans
178	Scientific & Technical Instruments
179	Security & Protection Services
180	Security Software & Services
181	Semiconductor - Broad Line
182	Semiconductor - Integrated Circuits
183	Semiconductor - Specialized
184	Semiconductor Equipment & Materials
185	Semiconductor- Memory Chips
186	Shipping
187	Silver
188	Small Tools & Accessories
189	Specialized Health Services

190	Specialty Chemicals
191	Specialty Eateries
192	Specialty Retail, Other
193	Sporting Activities
194	Sporting Goods
195	Sporting Goods Stores
196	Staffing & Outsourcing Services
197	Steel & Iron
198	Surety & Title Insurance
199	Synthetics
200	Technical & System Software
201	Technical Services
202	Telecom Services - Domestic
203	Telecom Services - Foreign
204	Textile - Apparel Clothing
205	Textile - Apparel Footwear & Accessoriess
206	Textile Industrial
207	Tobacco Products, Other
208	Toy & Hobby Stores
209	Toys & Games
210	Trucking
211	Trucks & Other Vehicles
212	Waste Management
213	Water Utilities
214	Wholesale, Other
215	Wireless Communications

SULKHAN METREVELI

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PORTFOLIO

Research and Teaching Associate, University Zurich, Institute of Media & Mass Communication Research

Mediachange and Innovation Divison, Media Economics, World Internet Project, Internet Research

- Demonstrated ability to perform beyond expectations in complex & dynamic academic and business environments; driven to succeed and eager to learn new skills by accepting new challenges.
- Innovative professional with the ability to develop technical applications to assist in trading decisions. Developed Calfor, a proprietary software that evaluates current news trends and makes trading decisions.
- Talented at developing relationships with co-workers/clients/key stakeholders and in conducting strategic analysis/research; superb project management skills.
- Dedicated, hardworking, and talented with the ability to lead, coach and mentor teams into achieving superior results; proficient in MS Office Suite with exemplary foreign language skills.
- ***Computer:*** MS Office Suite; SPSS; STATA; C++; Web Based/Web Design Programs/ Adobe Go Live/Dreamweaver

EDUCATION, FELLOWSHIPS & GRANTS

PHD STUDENT, UNIVERSITY OF ZURICH, Zurich, Switzerland, Pending
Institute of Mass Communication and Media Research – Doctoral Work, Central Bank Communication
Research Assistant, Swiss Economic Institute, KOF of ETH Zurich /Advisor, Prof. Dr. J.E. Sturm, Four (4) Projects

LICENTIATUS PHILOSOPHIAE, UNIVERSITY OF ZURICH, Zurich, Switzerland, 2006
Institute of Media and Mass Communication Research

BACHELOR OF JOURNALISM, IVANE JAVAKHISHVILI STATE UNIVERSITY OF TBILISI, Tbilisi, Georgia
Graduated with Honors

FELLOWSHIPS & GRANTS

Boveri Foundation Grant for Young Gifted People, Zurich, Switzerland, 2002-2006
Georgian State Fellowship for Excellent Academic Achievements; Tbilisi, Georgia, 1990-2000
Lions Club Fellowship for Gifted People, Murnau, Germany, 1998

LANGUAGES

Georgian (Native) • English (Very Good) ● German (Very Good) • Russian (Very Good) ● French (Basic)

PROFESSIONAL EXPERIENCE

Research and Teaching Associate, University of Zurich – Mediachange and Innovation Division, Institute of Mass Communication and Media Research, Zurich, Switzerland, 2011-present
Projects include: Fully automatized content analysis processes, World Internet Project, and SRG SSR (Swiss public broadcasting) online assessment.

Research Assistant, ETH Zurich – KOF Konjunkturforschungsstelle, Zurich, Switzerland, 2007-2012
Projects include: Central Bank communication, Index of Globalization, and the effects of NGO aid in abroad.

Interviewer, Project Adamo, College of Higher Education of Aargau, Aargau, Switzerland, 2005
Interviewing and coding the samples for the Swiss National Foundation Project "Adamo" in Russian language

Official Translator, Canton Zurich, High Court, Cantonal Police and the Prosecutors Office, 2000-2003
Translated official documents and conducted negotiations in German, Russian and Georgian Languages for

Columnist/Foreign Correspondent, Daily Georgian Newspaper "Akhali Epoka", 2000-2003
Political columnist for a popular & government-critical daily Georgian newspaper; shut down by the authorities